DOCUMENT RESUME

ED 438 769 IR 019 891

AUTHOR	Lantz, Agneta
TITLE	Breaking Information Barriers through Information Literacy: A Longitudinal and Interventional Study among Small-Firm Managers. Linkoping Studies in Education and Psychology No. 66.
INSTITUTION	Linkoping Univ. (Sweden).
REPORT NO	ISRN-LiU-IPP-STU-66-SE
ISBN	ISBN-91-7219-622-X
ISSN	ISSN-1102-7517
PUB DATE	1999-00-00
NOTE	241p.
AVAILABLE FROM	Department of Education and Psychology, Linkoping University, SE-581 83 Linkoping, Sweden.
PUB TYPE	Books (010) -- Dissertations/Theses - Doctoral Dissertations (041)
EDRS PRICE	MF01/PC10 Plus Postage.
DESCRIPTORS	Action Research; Case Studies; Foreign Countries; *Information Literacy; *Information Utilization; *Instructional Development; *Instructional Effectiveness; *Intervention; Interviews; Middle Management; Qualitative Research; Training
IDENTIFIERS	*Barriers to Information; Linkoping University (Sweden)

ABSTRACT

The primary aim of this dissertation is to contribute to an increased understanding of the information utilization process through studying impeding process determinants, information barriers, and how they might be tackled by pedagogical means. The study uses a qualitative approach within the tradition of action research. Case studies were made of the information situations of 23 managers from small manufacturing wood and mechanical industries. The project comprises: (1) diagnosis (in-depth interviews), focusing on barriers to information utilization; (2) planning and implementation of an educational intervention, focusing on how to minimize barriers; (3) evaluation of the intervention (interviews) to ascertain its effects; and (4) follow-up study (in-depth interviews) after several years. The results are described in terms of antecedent, process, and outcome variables. Perceived information barriers are analyzed at the individual, organization, and society level. Results indicate that information utilization reflects both person and situation. The managers' information utilization behavior is based on and controlled by his perceptions of the information situation at hand and memory representations from the past. It is shown that, mediated by motivational and other affective states, the quality of these representations, of which perceived information barriers are important constituents, guide his information utilization behavior. Results further indicate that educational measures seem to be a feasible way of minimizing certain barriers through information literacy. (Contains 346 references.) (Author/MES)

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Breaking Information Barriers Through Information Literacy

A Longitudinal and Interventional Study among Small-Firm Managers

Agneta Lantz

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Linköping Studies in Education and Psychology Dissertation No. 66

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Agneta Lantz

Akademisk avhandling

som med vederbörligt tillstånd av filosofiska fakulteten vid Linköpings Universitet för avläggande av filosofie doktorsexamen kommer att offentligt försvaras på Institutionen för pedagogik och psykologi, Sal 22 hus Dagny, fredagen den 26 november, 1999, kl. 14.00.

Abstract

The primary aim of this thesis is to contribute to an increased understanding of the information utilisation process through studying impeding process determinants, information barriers, and how they might be tackled by pedagogical means. This would be attained by studying the information situations of small-company managers. Three broad questions were to be answered by means of the project: Which barriers are perceived as obstructing the information utilisation of the managers studied? How is information utilisation affected by these barriers? Can barriers be eliminated or minimised by pedagogical means?

An interactional, cognitive approach to the problems serves as a broad theoretical construct of the study. The effects of barriers on an individual's information utilisation is seen as a dynamic interaction between the environment and the organism in terms of the user's cognitive system and the information barriers he encounters in an information setting.

The study uses a qualitative approach within the tradition of action research. Case studies were made of the information situations of twenty-three managers from small manufacturing wood and mechanical industries. The project comprises: (a) diagnosis (in-depth interviews) focusing on barriers to information utilisation, (b) planning and implementation of an educational intervention focusing on how to minimise barriers, (c) evaluation of the intervention (interviews) to ascertain its effects, and (d) follow-up study (in-depth interviews) after several years. The results are described in terms of antecedent, process and outcome variables.

Perceived information barriers are analysed at the individual, organization and society levels. The results indicate that information utilisation reflects both person and situation. The individual's, the manager's, information utilisation behaviour is based on and controlled by his perceptions of the information situation at hand and memory representations from the past. It is shown that, mediated by motivational and other affective states, the quality of these representations, of which perceived information barriers are important constituents, guide his information utilisation behaviour. Different utilisation profiles and styles of action illustrate this fact.

The results further indicate that educational measures seem to be a feasible way of minimising certain barriers. It is also shown that, as the information environment continues to change, there is need for a stable structure of support in order to bring about lasting changes. This study points to the possibility of breaking information barriers through information literacy. Theoretical and practical implications of the study are suggested.

Keywords: Information utilization, information barriers, information literacy, small companies, managers, libraries, librarians.

Department of Education and Psychology
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ISRN LiU-IPP-STU--66--SE ISBN 91-7219-622-x ISSN 1102-7517

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FACULTY OF ARTS AND SCIENCES
LINKÖPINGS UNIVERSITET

Linköping Studies in Education and Psychology No 66
Linköpings universitet, Department of Education and Psychology

Linköping 1999

4

Department of Education and Psychology
Linköping University
SE-581 83 Linköping, Sweden

ISRN LiU-IPP-STU--66--SE
ISBN 91-7219-622-x
ISSN 1102-7517

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Printed in Sweden by UniTryck, Linköping 1999

To Peter

Et ipsa scientia potestas est

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Acknowledgements

This work has been conducted over several years and it has not always been the project with the highest priority. The most difficult thing has not been to know what to do but, rather, to find the time for everything. These circumstances have, however, enabled me to integrate theory into practice.

A dissertation is the product of the help and encouragement of many people and I am indebted to each and everyone who have given me invaluable support. I would like to express my appreciation and gratitude to some persons who in different ways have guided me along the way and helped me to reach the goal.

It was Governor Kari Marklund who first inspired me to start the project when he was the chief librarian of the Linköping University Library. Thank You Kari, it was really worth the strain.

I am especially grateful to my former supervisor Professor Ingvar Werdelin who, long after having retired, read my manuscripts, criticised and always encouraged me to continue the work. He got me cross the first methodological thresholds and his insightful analysis of strengths and weaknesses forced me to advance my thinking in the subsequent revision of the manuscript. A special thanks also to Mrs Brita Werdelin for genuine interest in my research and for moral support at crucial stages.

During the final years, Professor Lars-Ove Dahlgren supervised my work. In an atmosphere of warmth and generous creativity, he gave support and constructive criticism in a perfect balance. Thank You very much for your encouragement and patience!

I would also like to thank my fellow doctoral students who have shared joy, strain and pain along the winding paths to reach the destination of getting the Ph.D. My warmest thanks to Anne Göransson. Having a best friend writing her thesis at the same time as myself means having someone who always knows exactly what it is like.

Grateful acknowledgement is hereby also made to Alexander de Courcy, who corrected my English.

Finally, a sincere thanks to my informants, the managers of the small businesses, who generously shared their experiences with me, my colleagues at Linköping University Library and other resource persons at Linköping University. Without their participation, this study would not have been possible.

Vikingstad, November, 1999

Agneta Lantz

Introduction

This monograph highlights a process of vital importance in modern society, the process of information utilization. Information is a vital concern today for highly developed societies like Sweden. Living and working in the information age requires access to and use of information of good quality to keep in touch with developments and process it into new knowledge. At the same time, the global nature of human interaction makes the ability to retrieve, evaluate and utilize relevant information among large amounts of data crucial. The purpose of this thesis is to contribute to an increased understanding of the process of information utilization through studying impeding process determinants, information barriers, and how they might be tackled by pedagogical means.

The background and origin of the project stems from my own experiences as a senior librarian at Linköping University Library. Through the years, I have during my daily reference work and teaching (information literacy skills) continuously been confronted with difficulties that students and other library users are facing during their information utilization processes. From these observations my personal interest in the information barrier problems was aroused as well as a need to learn more about this phenomenon and its effects on the process of information utilization.

The study of the information barrier problems is made within the framework of educational research, which has become increasingly concerned with pedagogical processes in society as a whole. This is in line with the fact that the scope of educational research has increased. The scientific discussion in education has implied that a most important task of educational research is to study conditions for change processes which can lead to the fulfilment of socially desirable goals (Stukat, 1971). Since the 1970's, the comprehensiveness of the study of pedagogical processes has been accentuated, as has the need for studies of premises for pedagogical processes in society including industrial life and the need to make substantial contributions to development and change. (See, for example, Wallin, Söderström and Hede, 1982.)

The development and distribution of knowledge as processes in society therefore form a natural and central area for educational research. However, the problem has an interdisciplinary character and it is, thus, essential to maintain a dialogue with other disciplines in order to obtain the desired comprehensive view.

Internationally, the field of interest to the present study belongs in the domain of Information Science, a problem-oriented discipline under development concerned with the effective transfer of information from human generators to human users; in other words, dealing with the problem of transmitting knowledge to those who need it (definition according to Wersig and Neveling, 1975; Belkin and Robertson, 1976). Wersig and Neveling (1975) stated the

historical reasons for the development of Information Science in the following way:

> .... not because of a specific phenomenon which had always existed and which now became an object of study - but because of a new necessity to study a problem which had completely changed its relevance for society. Nowadays the problem of transmitting knowledge to those who need it is a social responsibility, and this social responsibility seems to be the real background of 'information science' (ibid., p 134).

There is, however, no collectively accepted and universally valid definition of Information Science despite extensive efforts among scientists within the domain to define its basic phenomena. According to Thomas Kuhn's model of scientific development (1962), such a lack of common directionality and coordination can be seen as a typical characteristic of a discipline during a preparadigmatic period. Consequently, for the purpose of placing the present study in this field of research, a definition will be given. A number of definitions of Information Science are found in the literature, for example, by Vickery (1980) and Wilson (1987). The one given by Wilson seems to be suitably precise and narrow and has been accepted in the present work. According to him, the issues and aims of information science can be stated more precisely in the following way:

> Information science is the study of the generation, organization, transfer, and utilization of information. It is concerned with the nature of information in general, with the channels or 'carriers' of information, and with the information user. It is concerned with all aspects of the design and evaluation of information systems and services, from public libraries to computer-based information retrieval systems (ibid., p 410).

In Sweden, at the starting point of the present project, there was no corresponding problem- and purpose-oriented discipline called Information Science. Therefore, problems within this area had to be studied from a multidisciplinary point of view; for the development of a comprehensive and interpretative scientific understanding of information and knowledge processes in society, it is important to stress the need for research in various disciplines, including education. The first Swedish chair in Library and Information Science was established in Gothenburg in 1994.

Chapter 1

Being Informed in the Information Age

The purpose of this chapter is to give the general background of the study and to determine the domain to be studied and state the research goals. The introductory section places the research activity in a larger context and indicates reasons for it being carried out. The following section deals with the practical background and the design of the study. The last subsection gives a presentation of the study.

Rapid technical developments in Sweden and elsewhere have been accompanied by an equally rapid development of knowledge, resulting in an intensified and constantly increasing flow of information in society. The post World War II era has marked the beginning of a period of a rapidly increasing volume of research and advanced education (Dahllöf, 1971; Husén, 1980). One of the implications of the expansion of tertiary education has concerned the number of researchers which has grown rapidly, leading to an increased supply of information. By far the largest share of research activities, approximately two thirds, is carried out within industry (Höglund and Persson, 1980; Dyring, 1985). From a global perspective, the volumes of Swedish research and development is thought to amount to 1 to 2 percent of the entire volume of international research. The increase in available information has grown so large that the expression "information explosion" has been coined. During the short period of fifteen years, 1960 - 1975, the total supply of scientific and technical information quadrupled (Anderla, 1973; Garvey, 1979) and the sum of knowledge has doubled every five years since then (Breivik, 1998). Already in the late 1970s it was statet that, since the beginning of the 1960's the same amount of scientific and technical information has been published as during the entire previous era. Between 80 and 90 percent of all research ever carried out will appear during the lifetime of those currently involved (SOU 1977:71).

During this century we have experienced society's development from an earlier static and comparatively uncomplicated level to the present one, characterized by high complexity and very rapid development within a large number of areas. Because of the rapidly accelerating growth of scientific and technical information, our advanced and complex society is commonly described as an information society or a post-industrial one (Bell, 1976, 1980; Naisbitt, 1982; Naisbitt and Aburdene, 1986; Drambo, 1988; Magnusson, 1999a, 1999b). This new society is characterized by rapid developments in science and engineering and by massive societal efforts in all areas where information and information technology are a key resource. The American communication specialist Edwin Parker (1976) describes the era of information as "the second industrial revolution". After a period of industrial rationalization we face the rationalization of thought. Thus, three industrial revolutions have succeeded one on the other in the development of the industrial economy during the last century (Magnusson, 1999a, 1999b). The enormous change process that has occurred can be illu-

strated by means of analyses of change in professional structure in the United States since the 19th century (Parker, 1976; Porat, 1978); a completely new kind of society has sprung up. Having lived in a genuinely agrarian society until the end of the last century, we have now, after having passed through an industrial society stage, arrived at an information society stage (Bell, 1980) or the information age (Breivik, 1998). The report Europe and the Global Information Society (European Union High-Level Group on the Information Society, 1994) stresses that throughout the world, information and telecommunication technologies are bringing about a new industrial revolution which seems to be as significant as those that preceded it.

Information Use - a Requirement for Development

It can be concluded that information and knowledge are important conditions for a progressive development of society, and it may also be predicted that the well-being of society will increasingly depend on our ability to use globally produced knowledge and experience. Ginman (1983) maintains that the access to, for example, economic, technical, social and political information ought to be compared to the supply of energy and raw materials with respect to degree of urgency. Here, it is necessary to point out that the demand for information and knowledge not only concerns certain groups in society but has general validity, allowing for differences in amount and character, to all citizens. Depending on the situation of the user, different information needs and customs develop. (See, among others, Paisley, 1968; Wilson, 1980, 1981, 1994; Höglund and Persson, 1980; Ginman, 1983).

Thus, regardless of whether we scrutinize the socio-economic situation at the individual, organizational or societal level, we will find a definite need for information and knowledge to enable us to keep abreast of developments. Since technology develops rapidly, the economy expands and society changes rapidly, a continuous and, possibly, increasing demand for information arises to meet changes in the surrounding world. The information user, whether a person or an organization, may, in the terms of organizational theory, be compared to an open system, an information using and producing system (Simon, 1957; Argyris, 1960; Katz and Kahn, 1978; Havelock, 1969). In order to survive, this system must rely on its environment, which in turn is dependent on the latter for its development. This is accomplished by the information process. All development presupposes some kind of information use: researchers consume, transform and exchange information to generate new knowledge; practitioners consume information in support of their decisions, and so forth. A large number of studies have shown strong connections between input and output from the system, implying positive correlations between information use and productivity in the system. (See, for example, Allen, 1966, 1969, 1977; Höglund and Persson, 1980).

The accelerating flow of information makes it increasingly difficult for an individual to survey, retrieve, locate and utilize information necessary for

keeping up with developments; the intensified development of knowledge and information has been followed by a more accentuated problem of orientation. (See, among others, Tengström, 1987). The global nature of human interaction makes the ability to access and use information crucial. The capacity to change is largely determined by our ability to retrieve, process and utilize relevant information among large amounts of data.

For ages literacy, the ability to read and write, has been said to be the basic skill necessary for everyone. Today - as we move into the information age - this ability is equally important, but no longer sufficient. Being literate in the information age also requires skills in identifying an information need, searching and locating the information needed, evaluating the information found, organizing it and using it effectively and wisely (American Library Association, 1989; Breivik, 1992, 1998; Lantz, 1997, and others).

According to the American Library Association (1989) an information literate person is one who can recognize when information is needed, has the ability to locate, evaluate, and effectively use the required information. Effective strategies for information utilization are essential to being able to navigate on the ocean of knowledge in such a way that the specific piece of information that can help solving a specific problem in a specific situation can be identified and retrieved from the enormous amount of available data (Lantz, 1997). Computer literacy is, of course, a good qualification for information literacy. It must, however, be stressed that the concept of information literacy refers to more than just computer literacy. To be information literate you must understand how new information and knowledge is organized - i.e. how it is published, organized, stored and made accessible for retrieval; on the whole, it is necessary to have good knowledge about societal information processes, search aids, including information technology, and information resources available (American Library Association, 1989; Kuhlthau, 1995; Breivik, 1992, 1998; Lantz, 1997).

Increasingly insistent demands on man's ability to orient himself may consequently easily lead to a new type of equality problem in society; like educational studies that have shown increased differences between badly and well-educated people (see, for example, Coombs, 1968; Rubenson, 1975, 1976, 1986; Abrahamsson and Rubenson, 1986; Arwidsson, 1986; SOU 1991:56; SOU 1994:48; SOU 1995:68; SOU 1996:27; Magnusson, 1999b), information researchers maintain that widening gaps may occur between well-informed people and those less fortunate in this respect (see, among others, Nowak, Carlman and Wärneryd, 1968; Bell, 1976; Thunberg, 1982; Naisbitt, 1982, 1990; Naisbitt and Aburdene, 1986; European Commission, 1996; Carnoy, 1997). It can then be hypothesized that the provision of information will possibly become a political distribution question of the same importance as the problem of equality in education in society. (See also Broström and Ekeroth, 1977; Rubenson, 1986; Naisbitt, 1982; Naisbitt and Aburdene, 1986.) Widening gaps between the information rich and the information poor could result in social tension (Thorhauge et al, 1997).

Supply of Information - in Support of our Global Orientation

At the same time as the demands on the human ability to orient oneself in a changing world and keep abreast with its growth, there is a simultaneous increase in the need for and demands on a functioning information service in society with implications for libraries and other institutions concerned with the supply of information. Because the individual's ability to survey and control the flow of information diminishes, there will be obvious demands for methods to select and process information, both those used by libraries and other information providers, by those who wish to utilize the information. Efforts are being made, however, to improve information availability in order to maintain and increase competence in different sectors of society.

Computer technology and communication are increasingly used to augment efficiency in the traditional steps in information management, such as storage, registration, searching and distribution. Large data bases have been developed nationally and internationally to support storage and retrieval of information. In the mid-1980s, it was possible for the user, in addition to obtaining bibliographic details, to learn where documents were stored and, to a certain extent, order the requested documents on line. Efforts are also being made to increase the availability of the documents by adapting different information systems to the competence levels and needs of the users. (See, among others, Belkin, Oddy and Brooks, 1982a, 1982b; Belkin, 1985; Hjerppe, 1985; Ingwersen, 1982; Smith, 1980). In recent years, the introduction of international electronic networks (above all, the Internet), networked resources, CD-ROMs, multimedia and hypertext resources, electronic publishing including the introduction of electronic journals, etc. have had an enormous impact. It can thus be concluded that the development of technology means greater limitations to as well as possibilities for the provision of information; limitations because of the enormous accumulation of information and the difficulty in learning to retrieve and use it, and possibilities since the new technology facilitates and makes possible an efficient and satisfactory orientation in or retrieval of relevant information. The impact of information technology is so obvious that a new era in communication appears to have been opened (Lillie and Trice, 1989).

It is imperative that the development of the provision of information is related to the general development of society. As a support system for research and development and generally to support people's concern for their environment and facilitate their orientation in this context, it must be adapted to the activities it will serve. In recent years, the context of information supply has been subjected to revolutionary changes. New conditions, with the development of information technology as the most crucial challenge, have been the object of much attention resulting in national and international initiatives involving libraries and information technology policy.

On the European level, the Directorate General DG XIII/E/4 of the European Commission (The Unit of Libraries, Networking and Services) initiated a survey

study with the purpose of providing an overview of the situation with respect to information technologies in Nordic libraries in 1995. Included in the study were the EU-member countries Denmark, Finland and Sweden as well as the non-members Iceland and Norway. The five national reports were submitted to NORDINFO for the summary and the Nordic overview (NORDINFO, 1996). In another study focusing on the role of public libraries in the information age (Public Libraries and the Information Society, 1997) it is stressed that the ultimate goal in the context of the information society is to provide access to any type of information for anyone, at any time, anywhere. The study stresses the importance of the public library as a key player in local implementation of the information society. A description of the state of the art is provided as well as an analysis of what public libraries should do in order to adapt their traditional services to new ones to be able to respond to their users in the context of the information society. The study arrives at general recommendations as to initiatives in support of national, regional and local policies for public libraries as well as specific recommendations for developmental work to improve skills and competence as well as to develop new tools and services within the field of librarianship. The public library is visualized as an updated institution playing a number of key roles in the information society: An active partner in safeguarding democracy, providing uninhibited access to all published materials; a supporter of education and learning at many levels, delivering the raw material of knowledge; a local IT centre, providing access to hardware, software and networks, giving the citizens an opportunity to deal with a new and completely pervasive technology; and a cultural institution. Further, the European Commission (1998) is preparing a Green Paper on the Role of Libraries in the Information Society focusing on different kinds of libraries. The main purpose of the paper is to stimulate the development of a coherent approach to how libraries can best serve the needs of European citizens by providing mediated access to the growing wealth of digital resources. Background information has been collected on different European countries, including national policies.

In Sweden, libraries are affected by policy formulated in the Ministries of Education and Culture and have two planning bodies: BIBSAM for the research libraries and Statens Kulturråd for the public libraries. An overall national information technology policy was proposed in 1996 in order to broaden and develop the use of information technology (Regeringens proposition 1995/96:125). Goals and guidelines for a national strategy were established by the Riksdag in 1996 (Regeringens proposition 1996/97:3) in accordance with the government proposal. It is emphasised that education, the legal system and public information must be adapted to new information technology. In addition, the government should present annual reports on information technology issues and steps should be taken for a solution of security and vulnerability issues. In the budget proposals for 1997 (Regeringens proposition 1996/97:1) the Royal Library is given the task of developing and running an IT-based national library system based on LIBRIS, the joint system of the research libraries in Sweden. In addition, SUNET, the joint computer network of the university and higher

education system, will be upgraded and expanded in order to give public and county libraries better access.

Sweden has long been the only Nordic country without library legislation. In 1996/1997, however, a new library act (Regeringens proposition 1996/97:3) was established setting out national goals and guidelines. According to the law (SFS 1996:1596) all citizens shall have access to a public library. In every municipality there are to be public libraries, where the citizens can borrow literature free of charge. The bill also stresses that the public libraries should work on making computer-based information available to all citizens.

Considerable demands are thus placed on libraries and other centres of information as regards their flexibility and adaptability to changes in the environment surrounding these institutions and their users. This kind of adaptation requires good knowledge of the situations and needs of the users. (See, among others, Wilson, 1980, 1981, 1984, 1994; Höglund and Persson, 1980). However, a comprehensive knowledge base concerning people's information needs and uses has yet to be established. On the contrary, under various circumstances it is apparent that knowledge of the users' needs of information retrieval and of problems in this respect is very restricted. Existing studies have mainly focused on the information situations of researchers and engineers, and our image of information utilization has been limited predominantly to these categories, except for certain fragments concerning the situation of other professional groups (Wilson, 1984). Therefore, it is essential to develop knowledge of different groups of users and to carry out studies that enable us to understand the information process and problems related to this.

It is evident that relevant knowledge is important to our ability to develop goals as well as choosing strategies for change under various circumstances. Only when we have formed a solid basis of knowledge of the information situations of different groups in society, will we have created the necessary conditions for shaping goals and means for the efficient future provision of information. In order to create this base, we need research of different kinds: problem-solving research to attack concrete problems, problem-seeking, elucidating research creating a basis for further work, and finally problem generative research that can become a spearhead into the future by formulating new problems and suggesting new perspectives of the problems.

Information Needs in Enterprises

The environment in which organizations and enterprises exist has become increasingly unstable. The rapid growth of technology, the expansion of the economy and rapid social and political change imply continuous and ever increasing demands on businesses to change and adapt themselves so as to meet the demands of their environments (Schein, 1980; Argyris and Schön, 1977, 1978; Tushman & Romanelli, 1985; Low & MacMillan, 1988; Tsai, MacMillan and Low, 1991; Bridge, O'Neill and Cromie, 1998). It is assumed that organi-

zations continuously need to adapt themselves to global change; this adaptation is vital for the survival of the company. An organization that does not monitor technological, economic and value changes in its environment will not be able to survive (see, for example, Lawrence and Lorsch, 1969). It is evident that the death of firms is particularly characteristic of the small business sector (Storey, 1998). Examinations of the characteristics of survivors as opposed to non-survivors indicate the crucial role of above all product and market adjustments to ensure survival (North, Leigh and Smallbone, 1992; Storey, 1998). Adjustment is associated with survival (North et al, 1992; Storey, 1998).

Enterprises and individuals thus sometimes live in a state of uncertainty with regard to future effects of environmental change, for example, political development, business trends, markets and new technology. Especially small enterprises are said to operate in greater uncertainty compared to large enterprises, thus making the former particularly vulnerable (Storey, 1998). In addition, the situation is complicated by the fact that certain changes are difficult to predict. (See, among others, Söderström, 1981). Knowledge, competency and quality are crucial factors for growth and survival (SOU 1994:48, SOU 1996:27; SOU 1996:164).

In this perspective, it appears evident that the use of information and knowledge plays a vital role in the survival and development of enterprises and organizations. The importance of a searching and learning process that enables organizations and companies to adapt to their environments has been stressed within the discipline of systems theory (Söderström, 1981; Sjöstrand, 1987; Thompson, 1988; Arbnor and Bjerke, 1994). Often this condition is referred to in terms of organizational learning. Accordingly, a system is expected to change its structure and value system continuously as a result of being confronted with new situations, testing new modes of behaviour and receiving and utilizing feedback from the environment (Miles, 1975; Argyris and Schön, 1978; Pfeffer and Salancik, 1978; Aldrich, 1979; Levitt and March, 1988; March, 1988; Normann, 1993, 1997). The connection between global dependence, processes, change and development of knowledge in organizations is then emphasized. Certain researchers (Schein, 1980; and others) stress that the capacity for change in an enterprise or other organization is dependent on mechanisms that retrieve information about the changes in the environment and by the possibility of using processes of learning to apply this information.

In Sweden and elsewhere, since the late 1960s or early 1970s, emphasis has been placed on society's role in meeting the need for information about industrial product development. Especially small and medium-sized companies have been mentioned as a specific target group for urgent attention (SOU 1972:78; OECD 1974, 1980; Bannock and Albach, 1991; Davidsson, Lindmark and Olofsson, 1994; Reynolds, Storey and Westhead, 1994). In this context, such companies are defined as having at most 199 employees (Official Statistics Sweden, 1982). They make up the majority of firms in most countries and represent an important and growing share of production and employment. Information provision to this group is stressed since these enterprises usually lack sufficient in-house research, development and information facilities, the

necessary know-how and the informal contacts that larger enterprises have at their disposal. The societal intentions of stimulating enhanced and reinforced knowledge transfer is also articulated by the potential value of this target group in politico-economic terms and by the expected value that scientific and technical information represents to industry. In most OECD countries, stimulation of industrial technology transfer has become an important aspect of national science and technology policies (OECD, 1974, 1980; Rothwell and Zegveld, 1981; SOU 1992:7; SOU 1993:70; SOU 1996:69, Storey, 1998). These societal intentions are reflected in efforts to strengthen existing information services and to establish new transfer points; especially library and university co-operation with small industries is stressed (OECD, 1974, 1980, 1982; Rupp, 1976; Rothwell and Zegveld, 1980; National Science Board, 1981; Sörlie, 1982; Johansson, 1997). In Sweden, the societal intentions concerning university contributions to knowledge development within industry are apparent in the Government Bill (Regeringens proposition 1981/82:106) concerned with experiments using so-called contact researchers. This bill prescribes that teachers and researchers should be placed at the disposal of small and medium-sized companies, authorities and organizations. The researchers' and teachers' duties are said to be to solve urgent problems in the enterprises.

From 1978, the Swedish Delegation for Scientific and Technical Information, DFI, and its predecessor, SINFDOK, financed projects dealing with information activities in these target groups. A starting-point for these activities was the experiences of extension service in agriculture (Nitsch, 1972, 1974), which aimed at stimulating farmers to adopt new methods of cultivation . Most of these projects have had practical implications, often in the form of experiments designed to acquire experience of the information needs of this category of companies, using practical work with the supply of information. The projects carried out, particularly those reported by Lindmark and Marklund, (1978), Backman, Lindmark and Marklund, (1979), can be regarded as examples of ways in which efforts have been undertaken to make societal contributions to a target group which is in need of urgent attention while decision makers wait for the results of empirical and theoretical research. The experience thus gained contributes to the development of a knowledge base of information needs of small and medium-sized companies through observations from practice, organized in such a way that it provides glimpses of the problem of information provision to this category of users.

Experiences in Sweden and elsewhere indicate that transferring technology to companies which are fairly small is a very difficult problem. In trying to bring new technology to this target group, governments have tried different strategies, but very few of these strategies have been successful (Allen, 1977; Capital Planning Information, 1982; Allen, Hyman and Pinckney, 1983; SOU 1994:48; Johansson, 1997). Several investigations has pointed to the fact that the transfer of knowledge to small enterprises does not reach the recipients (Tydén, 1994). One reason for these failures may be the fact that the main stress tends to be placed on transferring information without sufficient attention being paid to the real information needs of the users (Capital Planning Information, 1982) and

without sufficient consideration being paid to the operational activities of the enterprises and the conditions governing these activities (SOU 1994:48). It has also been stressed that implementing policies prior to well-established research being in place is a characteristic of many governments (Karlsson, Johannisson and Storey, 1993).

So, whether perceived information needs will result in information utilization or not seems to depend on a vast range of conditions which have limiting or obstructing effects on the information utilization process. Vose (1982) states that small and medium-sized companies seem to have a wall of obstacles to climb to obtain scientific and technical information and use it. In a report presenting the outcomes of an evaluation of activities by Norsk Senter for Informatikk (NSI) and Norsk Produktivitetsinstitutt (NPI) aimed at introducing computerized information retrieval in Norway, Roraas and Vangen (1982) drew the conclusion that to achieve an effective transfer of information to small and medium-sized companies, it is necessary to take the information barrier problems into serious consideration.

It can be concluded that the interest among politicians and policy-makers in stimulating small enterprises has increased in the last ten years (Frank and Landström, 1997). From the perspective of the present study of information barriers, this fact indicates that at the start of the project in the 1980s it was a core question, and today, 1998, it still remains a core question or perhaps a question of more interest than ever before. The problems still need to be solved (Johansson, 1997). New directions and new methods for knowledge development and knowledge transfer to small enterprises are required (SOU 1994:48).

There is consequently a great need for research on this target group so that knowledge of its information situation can be gathered and an interpretative scientific understanding created. The results can be used to create an appropriate supply of information based on the users' demands and needs. The demands for quick solutions to urgent societal problems must not result in disregard for well-developed knowledge and understanding of factors that determine information utilization. Developing a basis of knowledge about influencing factors, above all about barriers that prevent the use of information, seems especially important if the intention is to promote the transfer of scientific and technical knowledge to industry.

Design of the Study

Determining the Objectives of the Study

In the light of the background, presented above, the purpose of the present study is to explore the problems of barriers affecting the process of information utilization and thereby to contribute to an increased understanding of the process of information and problems related to it. This means that the focus is on a question of vital importance for creating the knowledge base from which goals

and means can be derived in order to stimulate information use. If adequate measures are to be found, it is important to have a thorough understanding of such determinants.

The theme chosen is of a general character and consequently of importance to different user groups in society. According to the previous subsections of this chapter, it is a question with implications for individuals and organizations in all sectors of society as well as for society itself. Consequently, it can be hypothesized that solving this question is essential for the maintenance and development of professional competence in society at large, as well as for the maintenance of democracy by creating prerequisites for taking advantage of each individual's civil rights and bridging the gaps between those who are rich and those who are poor with regard to opportunities for utilising information. (See, Chapter 1, Supply of Information - in Support of our Global Orientation.)

I could have chosen any group of my study, but the emphasis placed on society's role in meeting information needs in small companies, the demonstrated difficulty met when transferring scientific and technical information to those companies, and the need for research on this target group (see Chapter 1, Information Needs in Enterprises), oriented my investigation of information barriers towards the study of small and medium-sized companies and their ability to satisfy their information needs. The contribution of scientific knowledge of the conditions for information utilization should be useful in facilitating the development of information services, especially to this target group.

I am fully aware of the fact that information barriers are just part of the problems managers of small companies are facing. Thus, the empirical part of the actual study could be regarded as a case study as regards choice of study group and as a study of one of several problems faced by the group under scrutiny.

The point of view taken in my investigation is that of the information user in the context of his or her working role, a perspective that needs attention according to the literature. (See, for example, Wilson, 1980, 1981, 1994.) In the present study, this means an exploration of the problems of information barriers as experienced by managers of small and medium-sized manufacturing wood industries and mechanical engineering companies (by definition, within the range of 5 to 199 employees). Geographically, the study is restricted to the County of Östergötland. (For a description of the group studied, see Chapter 4, Individuals Studied.)

The comparatively uncharted nature of this field of research means that the approach can be characterized as explorative and descriptive. This means, in turn, that the aim of the study is to provide empirically grounded knowledge of the information barrier problems through the uncovering of facts, and to arrive at a description of the problems as perceived by the users (the managers) and the conceptions they form of the problems. (See further, Chapter 4, Choice of Method.) The project thus aims to identify barriers as they are perceived by managers of small and medium-sized companies. Furthermore, the project tries to obtain detailed knowledge of the problems of information barriers by introducing a process of development and change, a pedagogical intervention, into

the work of trying to eliminate or minimize barriers. It is, however, important to stress that the evaluation of the intervention should not be regarded as just a program evaluation study. It aims at providing a further dimension or facet of the problems studied; that means knowledge of whether and how information barriers can be broken or minimized by pedagogical means as well as knowledge of such pedagogical processes.

The present project comprises six main themes:

- survey of perceived barriers to information utilization,
- analysis of the barriers found,
- choice of categories of barriers with the goal of attempting to improve the barrier situation,
- planning and implementation of an educational intervention aiming at minimizing barriers and stimulating motivation for information use, and finally
- evaluation of the intervention to ascertain its outcomes
- follow-up study after several years.

The intent of these themes can be summarized in the form of three broad questions to be answered:

- Which barriers are perceived as obstructing information utilization by the managers studied?
- How is information utilization affected by these barriers?
- Can these barriers be eliminated or minimized by means of pedagogical measures?

The study seeks to use a holistic, theoretical framework for mapping the problems of barriers affecting the individual's information utilization process. This will enable us to understand how various variables interact and affect the ability to utilise information and knowledge. The intention is to acquire empirically grounded knowledge of the boundary conditions of the information utilization process that can contribute to an increased understanding of this process in order to promote progress and success in society. (See, Chapter 2.)

Methodologically, the project uses a qualitative approach within the tradition of action related research. This means that an open or flexible model is used characterized by action-reaction and involving flexibility and adjustment based on what happens during the research activities. It has, however, to be stressed that the interventional activities of the actual study are of a minor kind. Data are collected by means of a small-scale case study approach based on in-depth interviews and other techniques. (See, Chapter 3, Action-Related Research and Chapter 4, Choice of Method). The approach chosen can be seen as an attempt to obtain an optimal solution of the research problem within the existing framework of the study. An overview of different phases and principal activities during the project is given in Section Chapter 4, Conducting the Empirical Study, Table 3.

The Setting of the Study

The present study was carried out within the framework of a scholarship given by The Swedish Delegation for Scientific and Technical Information (DFI), Stockholm, and with the support of the Faculty of Arts and Science at Linköping University. The project was carried out at The Department of Education and Psychology at Linköping University. Certain activities have been performed in collaboration with Linköping University Library and The Center for Technology Transfer at the same university (see, Chapter 8).

The existing framework, in terms of limited funds and other resources, necessarily limited the goals that could be achieved as well as the planning and execution of the activities needed to meet these goals. Thus, only a small-scale study was possible within the degrees of freedom avilable. The execution of the study was, furthermore, to a large extent dependent of the willingness and ability of the individuals studied to participate in the research activities. (See, Chapter 4, Individuals Studied, and Analysis of Drop-Out from the Study.) Furthermore, the limited funds available led to the fact that all resource persons other than the researcher were recruited on a voluntary basis for work within the framework of their normal official duties. (See further, Chapter 8.)

The General Outline of the Dissertation

Against the background, objectives and design of the research presented earlier in this introductory chapter, the chapters 2 and 3 will present the theoretical framework of the study; that means the theoretical points of departure that I have used in my research. Chapter 2 will present a holistic theoretical framework for analysing the information barrier problems affecting information utilization. A model for analysis and interpretation of data is suggested and used for a review of the literature. Chapter 3 will deal with methodological considerations taken in drawing up the plan of research by placing the latter in the perspective of data collection techniques.

Chapter 4 will describe the generating and analysing of data based on the design, the objectives described in Chapter 1 and the theoretical framework described in the chapters 2 and 3. The focus will be on the choice of method, individuals studied, the conducting of the empirical research and the data analysis.

Chapters 5 - 10 comprise the empirical part of the dissertation. In the chapters 5, 6 and 7 the results of the research will be described and analysed in terms of antecedents at the individual, organization and society levels. Chapters 8 and 9 will focus on the intervention processes and their outcomes. The description of data in the chapters 5 - 9 will be made according to the outline of display modes given in Chapter 4, Variables and Data Analysis. Chapter 10 will present the results of a follow-up study focusing on the development from the mid 1980's to 1998. Above all the reader will meet ethnographic stories of six small-firm managers, presented one by one, and then interpreted and summa-

rised. Finally, the three different approaches which were discerned with regard to information usage are described and compared.

Chapter 11, finally, will bring the different parts of the research together in a summary and discussion of the main findings related to the objectives of the study and the theoretical framework. Finally, some methodological limitations will be identified and the theoretical and practical implications of the study discussed.

Chapter 2

The Information Barrier Problem

Our ability to achieve a comprehensive understanding of the information barrier problems affecting the process of information utilization is governed largely by the conceptual or theoretical framework into which it is placed. One purpose of my monograph is to delineate a theoretical framework into which the problems of the study can be placed in a perspective of relevant theory and empirical research. In the present chapter, a holistic theoretical framework for analysing the information barrier problems affecting information utilization is outlined.

For the present study, an interactional cognitive approach to the problems will be presented in the following.

The Cognitive View

In the focus of the person-centered cognitive view of information, utilization is the concept of *meaning*. Wilson (1984) states:

> Meaning is involved not only in all aspects of information generation, transfer and use, but also in the way people define themselves, their lives and their actions (p. 197).

Action can, in turn, according to Hills (1982), be conceived of as

> the control of the expenditure of effort to realize symbolically defined intentions in symbolically defined situations (p 39).

The cognitive view has been the subject of increased interest in the field of information science, examples of authors who have stressed this are De Mey (1982), Belkin (1984), Ingwersen (1984) and Wilson (1984, 1994). Influenced by the work of Schutz (1967), Wilson's view is phenomenological in character. According to the phenomenological perspective, individuals construct their own social world from the world of appearances around them (Schutz, 1967). Thus, according to Wilson (1994), information needs can be derived from an individual's attempts to make sense of the world.

Psychological research focusing upon the impact of situational factors (situational and environmental stimuli) on human beings indicates that the meaning involved in, or the perception of, the situation forms an essential factor affecting a person's behaviour (Ekehammar and Magnusson, 1973). Investigations into the relationship between the individuals' perceptions of situations and their reactions to situations (Magnusson and Ekehammar, 1975, 1978; Ekehammar, Schalling and Magnusson, 1975) show that these reactions are to a large extent a function of their perception of the same situation. But, as stressed

by Endler (1981b), the relation between perception and reaction is mediated by motivational determinants. According to Endler, this circumstance accounts for the fact that two individuals perceiving the same situation similarly may react quite differently.

As noted by Pervin (1978), the evident importance of the meaning of a situation as a determinant of behaviour has led researchers to define situations in terms of their perceived properties or dimensions (Endler and Magnusson, 1976; Endler, 1981a; Magnusson, 1978), as opposed to definitions on the basis of objective characteristics (Rotter, 1955; Barker, 1965) or objectively measured external characteristics (Sells, 1963). Within educational research, the evident importance of meaning has given rise to proposals stating that qualitative differences between the individuals' situations may be described in terms of the ways in which people interpret their situations (Marton et al, 1999). A relevant question is then how the context in which a situation or phenomenon is experienced affects the individual's interpretation of the latter. Lundgren (1979) has pointed out,

> The explanation of various processes in education has according to our view to be explained not from the single individual per se but from the way in which he forms the conception of the real world around him (ibid., p 34).

A Context-bound Holistic Perspective of Research

The approach taken in this particular study of information barriers is based on the assumption that the problems of information utilization and information barriers vary according to personal characteristics as well as to context. Analogously, the description of the reality being studied requires consideration of the individual within his surrounding context. The situations people encounter include stimuli at various levels. In Magnusson's view (1978):

> The total environment influencing individuals' lives consists of a complex system of physical-geographical, social, and cultural factors which are continuously interacting and changing, at different levels of proximity to the individual (ibid., p. 1).

Even though there is much evidence that information utilization is dependent on contextual factors, we need research where social and societal circumstances are taken into account (see e.g. Wilson, 1980, 1981, 1994). Wilson (1981) presented a model of the information-seeking process which was later amended by incorporating a model of Ellis (1989) into an overall model. Wilson focuses mainly on the needs that motivate information search behaviour, while Ellis is concerned solely with identifying the stages of the information-seeking process.

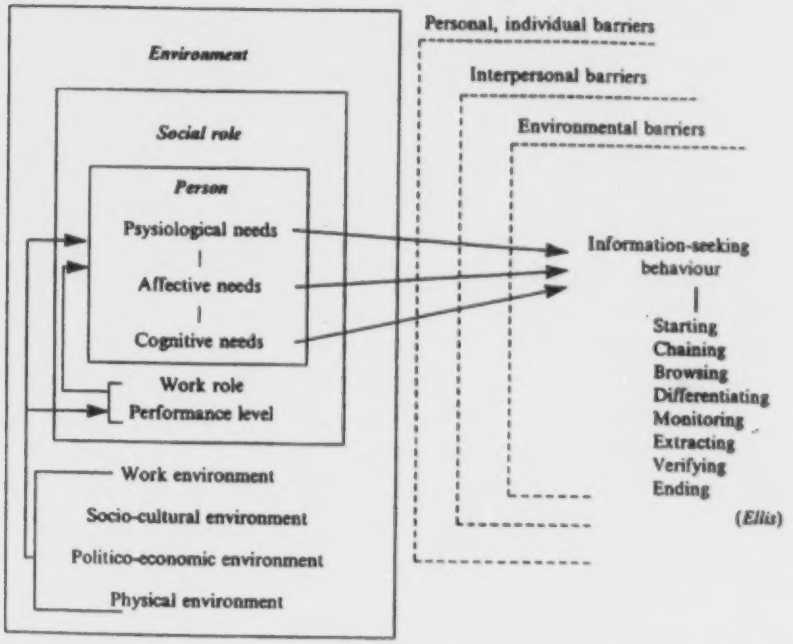

Fig. 1. Information Needs and Information-Seeking Behaviour (Wilson, 1994, p. 33)

Wilson's conceptualization of information needs was found valuable for the design of the present study, for the framework chosen and for the definition of context.

Even if it is well-known, the notion of context deserves further elucidation. As noted by De Mey (1982), this notion is problematic since it has no well defined boundary that tells us when it has been sufficiently checked. Consequently, in most situations it is possible to find alternative interpretations. One way of handling this problem is to leave the definition to the subjects themselves depending on what they consider relevant. In this case, the defined context corresponds to the knowledge possessed by the information processor, the viewer; it is created by the recipient of the message (Bateson, 1988; De Mey, 1982). According to De Mey, this shift marks the point where a context-oriented approach changes into a cognitive and is no longer just considered to be part of the surroundings and in some way external to the perceiver. As indicated by Winograd (1977, p 168), the meaning of the notion of context has therefore changed:

> Context ... is best formulated in terms of the *cognitive structures* of speaker and hearer, rather than in terms of linguistic text or facts about the situation in which an utterance is produced (ibid., p 168).

Supplied by the participant managers the notion used in the present study comes close to the cognitive view context.

The results imply that the frame of interpretation must be widened to cover the contextual unit of which the individual is a part - a societal unit. Three contextual levels are seen as constituent parts of this unit: the individual, the

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organization and the society levels. Together, these three levels correspond to the context which, theoretically, must be considered in analyses and interpretations of the information barrier problems possible in a holistic perspective. It is by taking the perceived situation of inhibiting and modifying factors on these levels as their point of departure that individuals analyse and interpret different problems in order to choose alternative behaviour.

Broadening the research perspective in this way, we are better prepared to create theories explaining the interplay between information utilization and the societal context by stressing information utilization as a societal process. At the starting point of the present study, this meant accepting a view different from the one hitherto prevailing in the field of information research, and in my opinion it is of utmost importance to supplement earlier results with more profound knowledge and understanding of natural information situations, where obstructing barriers and problems can be viewed and considered in the planning of information services.

Analysis Model

In order to make intelligible the complex of variables that influence information utilization, it is found valuable to build a model for analysis and interpretation of data. My choice of model takes as its starting point the work of a group of researchers called frame factor theorists. Within the field of educational research these researchers have, on the basis of empirical evidence, tried to create an understanding of the importance of frames to educational processes.

Dahllöf (1967) used frame factors to refer to conditions beyond the control of teachers and pupils which limit the process of education. In the field of curriculum and classroom studies, Dahllöf (1971) and Lundgren (1972, 1979, 1981) have studied the teaching process as a mediator between three groups of variables: different kinds of constituent, organizational and physical constraints making up the frame factors, and outcome variables.

Werdelin (1983) analyses the concept of frames surrounding an educational activity or, he states, any human activity. He draws attention to the fact that the frames do not necessarily mean obstacles but may also point to opportunities, that is, they set the limits within which one is free to operate. Thus, the frame factors can be considered as determining the feasibility of the activity (Werdelin, 1977, 1982).

He uses two dimensions in the functionalistic analysis of the concept of frames. The first dimension refers to the difference between *internal and external frames*. Internal frames have their origin in the system or individuals considered and studied, e.g. factors such as the background of individuals, their knowledge, skills and attitudes, opinions and emotions. Werdelin uses external frames to refer to those frames which depend on factors outside the system but affect the activity in question, for example, available resources, laws, regulations, the structure of society, environmental attitudes and opinions, etc. The other dimension distinguishes between *frames of resources and frames of*

preparedness. The former obviously include factors such as economic restrictions, as well as the availability of material and manpower. But also the ability, knowledge and skills of people involved form frames of resources. Werdelin uses the term frames of preparedness to refer to factors influencing the opportunities for the activity, which e.g. include laws, norms, regulations, the structure of society, as well as attitudes and opinions found in the system or group involved.

This analysis of frame factors seems to be relevant to information utilization activities as well. The results of the present study indicate that limitations and inhibitions at different contextual levels simultaneously provide the problem solver (or information user) with frames which determine his degree of freedom in the process of information utilization. The analysis of information barriers can then be looked upon as an analysis of the feasibility of information utilization.

By combining the two dimensions, the concept of frames can, according to Werdelin (1977, 1982), be summarized in a model which seems relevant since it is applicable at those levels of analysis which it is necessary to consider in order to be able to handle the information barrier problems from a comprehensive point of view. This means a description that enables the interdependence between the different levels of analysis to be considered. Such a comprehensive model makes it possible to describe conditions and restraints in an individual's information situation which affect his ability to satisfy his or her information and knowledge needs.

According to the model shown in figure 2, the set of frame factors is divided into four subsets, each of which include a collection of related conditions. Applied to the analysis of the information barrier problems, the model indicates that the information barriers can be divided into four fields of related factors: a field of internal resources, a field of internal preparedness, a field of external preparedness and a field of external resources.

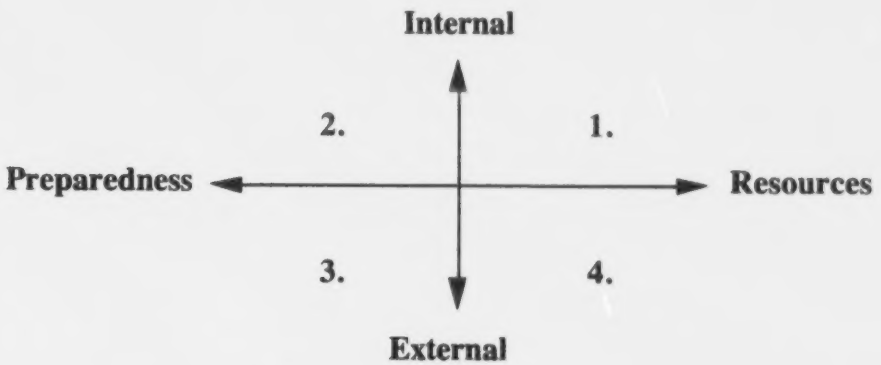

Fig. 2. Model for Analysing the Problems of Information Barriers (cited from Werdelin, 1982, p. 419, the Concept of Frames).

The field of internal resources, (1), covers conditions referring to prerequisites in terms of capability, knowledge, insight, experiences and skills of all kinds. *The field of internal preparedness,* (2), refers to prerequisites which can be characterized as mental sets: attitudes, beliefs, opinions, emotions and other motivational and affective states. *The field of external preparedness,* (3), includes external determinant conditions such as restrictions imposed by laws, regulations, norms, public opinions and attitudes as well as societal intentions; in other words. much of what is said to be human conventions or general consent. *The field of external resources,* (4), finally, refers to limitations in terms of availability of external economical resources, material, informational resources, personnel and time, which are placed at the disposal of the system studied.

This model is useful because it is applicable at those levels of analysis which are necessary to allow the handling of the information barrier problem from a comprehensive point of view; from the simple four-field model, a more comprehensive model of influencing factors can be derived which enables the interdependence between the different levels of analysis to be considered. Altogether, such a comprehensive model can serve as a basis for analysis and interpretation, thus making it possible to understand how different factors interact and influence information utilization.

At the individual, organizational and society levels there are limitations and barriers which, as shown by the four fields in the model, explain the perceived degrees of freedom within which the individual problem solver has to satisfy his or her information and knowledge needs. Furthermore, there is a mutual dependence between the different levels of analysis. Societal conditions make demands on the organization, in this case the company. Furthermore, the individual is influenced by societal as well as organizational conditions. Taking these circumstances into consideration, we arrive at an outline of a model as presented in figure 3, below.

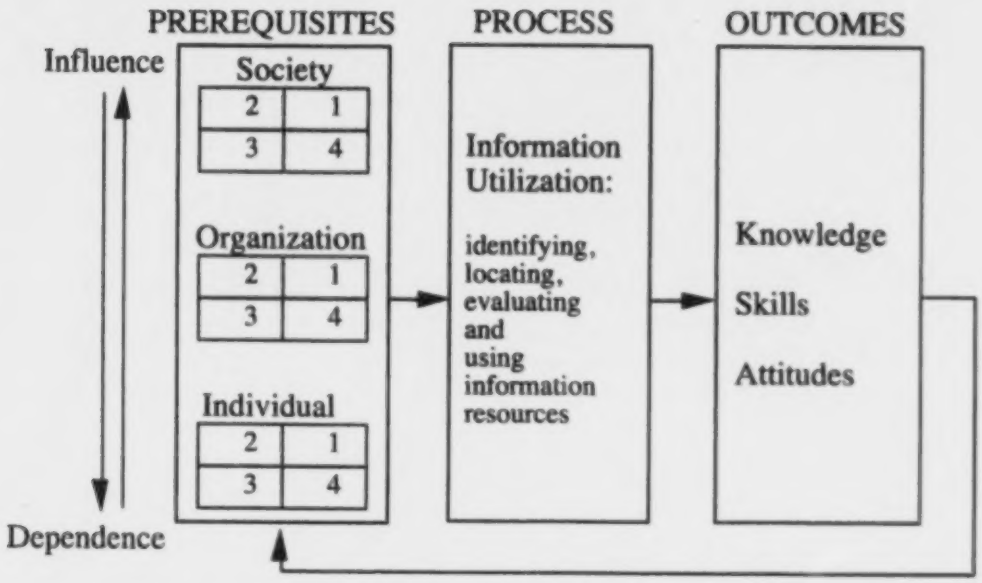

Fig. 3. A Holistic Model of the Information Utilization Process with Regard to Information Barriers at the Societal, Organizational and Individual Levels.

The model, presented in figure 3, views the information barrier problems from a perspective of change and development, suggesting that the individual with increased knowledge, skills and changed attitudes might be able to feed data back into the system to affect and change his own situation as well as the conditions at the organizational and societal levels in the future.

A Description of the Three Levels of Analysis according to the Model

The purpose of this section of the chapter is to describe the three levels of analysis from a perspective of relevant theory and empirical research. The presentation will focus on determining conditions distributed across the four fields of the proposed model presented in Chapter 2, the Analysis Model. Influences and interdependencies between the different levels of analysis as well as between the different domains of related factors will be clarified.

Society Level Variables

Information provision in society can be described as a flow from society via societal goals, resources, etc. as far as to the outcomes of information processes in social, economical, technical and political terms where societal conditions influence each phase. The socio-structural circumstances turn into conditions and principles for macro as well as micro actors. Consequently, it can be hypothesised that there is always a correspondence or relationship between

information utilization and the characteristics of the society in which this takes place. Society itself is a major force affecting information utilization. The concrete practice or reality correspond to the prescribed demands claimed by societal circumstances.

Against this background, it can be stated hypothetically that certain variables which operate as constraints for lower levels seem possible to manipulate at higher levels (See, Beyer and Trice, 1982). Variables not controlled at either the organizational or the individual level, such as laws or the supply of resources, may be accessible to control at the societal level.

Because of the demonstrated importance of societal conditions, organization theory often describes environments in terms of the resources or the information they make available to organizations and their members (Aldrich, 1979). This section aims at providing a deeper understanding of society-level variables which have a determining or limiting effect on information utilization.

The Field of Internal Resources

The design and outcomes of the educational system are essential forces affecting change and development in modern society. Furthermore, the general educational level in society, seen from the point of view of its technical status or in other respects, is an important prerequisite of all processes of communication and information utilization.

Of great importance are also the qualifications of different professionals in agencies, authorities and other service organizations, e.g. librarians and other staff in the surrounding environment of users, in this case small enterprises. At the same time, as the complex of channels is an essential link between sources and recipients, it is also a filter through which informative communications must pass (Vickery and Vickery, 1992).

According to Havelock (1969), a linkage function exists when two systems are connected by an information flow providing a channel or channels, for example, between research and practice or between resource system (library or other service organization) and user. It was stressed by Peters (1973), that language and cultural obstacles serve as filters blocking and distorting the flow of scientific and technical information. According to W.J. Duncan (1972), personal barriers such as varying expectations and values, real and imagined role perceptions and status discrepancies as well as language may circumvent communication at the interface between resource systems and users. Only the existence of mutual understanding between the two systems provides a satisfactory basis for meaningful communication. Separate vocabularies or coding schemes, technical jargon and inconsistent terminology may be at the root of difficulties that arise at the interface of user system and search system (Duncan, W.J., 1972; Pearson 1973; Wilkin, 1977). There is evidence that some agencies lack the appropriate expertise to help small industries (Capital Planning, 1982; Johansson, 1997). Further, it has been demonstrated that there is a cultural

barrier deterring interaction between university or research institute staff and small firms with limited technical capacity (Allen et al. 1983).

The Field of Internal Preparedness

Culture provides general standards of desirability in society. Thus, one general trait of modern society is developed norms of rationality involving expectations of organizational action. Organizations are expected to produce results based on reasonable and rational behaviour (Thompson, 1988). Societal expectations are often reflected in and altered into public policy measures and activities of planned development and change in order to arrive at expected end results. Thus, development and change in society are (indirectly) achieved politically through the translation of societal issues into informational issues and by improving the system of information supply, for example, by developmental work. Consequently, there is a narrow linkage between societal development and change, information politics, and developmental work within the field of information provision.

As regards information provision, it is possible to discern both a central sub-level and a local level at the societal level. The state defines and establishes the goals as well as prescribing the conditions for information provision, at the same time as local practice is regulated by financial grants and through the prescriptions of how allocated money may be used. Here, the decisions made by the State turn into frames for the local activities involving information provision as well as for individual information users.

Piatier (1984) draws attention to the fact that the whole system of values in society such as attitudes towards science, towards economic and social change, and towards the enterprise and its entrepreneurship are important determining factors. According to him, many innovations can be explained on the basis of optimism or pessimism in society at a given moment. The results of the present study show that this fact is important also to information utilization.

In a study of barriers to innovations, Piatier (1984) makes a distinction between, on the one hand, general policy measures affecting all enterprises, and, on the other, measures to support innovation causing barriers regarded as either general or relative. As regards information utilization, both kinds of barriers are important determinants.

The climate representing a set of circumstances governs the psychology of innovators as well as that of individuals and organizations (Piatier, 1984). Also influenced are authorities and others surrounding an organization. According to Gaudin (1980), the world of politics and the authorities bear some responsibility for sunny or dull climates. Fluctuating and shifting societal intentions and goals create a situation characterized by environmental instability.

The Field of External Preparedness

Conditions within the field of external preparedness also have to be considered when discussing the climate of society. National laws, taxes, the legal structure and its agents who enforce and monitor compliance are important determinants. Taken together, the effects of these variables result in a climate of freedom and control where favourable periods alternate with more unfavourable ones (Gaudin, 1980). The climate, then, is very much a question of freedom of action in society. (cf. Piatier, 1984). Authors like Myers and Sweezy (1978) have found that government regulatory processes may block many good innovations.

The Field of External Resources

A dynamic environment can supply opportunities which entrepreneurial oriented firms can take advantage of (Stevenson and Gumpert, 1992). National economic planning and other state investments are major determinants of what information resources are made available to organizations and individual users.
The budget drawn up by the Government for information provision and library services reflects the need for and expectations of information provision on the part of the state. The budget provides general economical resources, personnel, buildings, information technology, etc. Generally speaking, it is a question of having goals and economic resources transformed into earmarked resources to generate expected outcomes. The allocations are then reflected in communication networks, information retrieval systems, the recruitment of information professionals and library staff, suitable buildings, equipment, material, documents, etc., all directing and dimensioning information provision in order to fulfil the requirement of a qualitative and quantitative information flow in society.

However, there are barriers associated with the physical availability of the information as well as with its form and content. (Cf. among others, Höglund and Persson, 1980.) The extremely intense information flow in society tends to result in a situation of information overload. There are also barriers with respect to the design and capacity of information retrieval systems (Höglund and Persson, 1980; Vickery and Vickery, 1992). According to W.J. Duncan (1972), economic-political philosophies surrounding the information flow system may influence the speed at which information flows. There is also empirical evidence that agencies sometimes prevent their clients from having access to information by establishing bureaucratic barriers and by advertising too rarely (Dervin, 1976). The costs of information resources are important determinants of information utilization as well. In addition, the probability of an individual exchanging information with others decreases sharply with the geographical distance to information resources (Allen and Cohen, 1969; Höglund and Persson, 1980). As regards information availability, there is also empirical evidence of an urgent need for special guides and other means of information

seeking for relevant literature (for example bibliographies) within the knowledge field of small firms (Westberg, 1983; Höglund and Persson, 1983).

However, the environment of which information utilization is part includes all economic agents besides the State. In addition to groups involved in the decision process such as governmental agencies, unions and trade associations, the task environment of organizations also includes customers (distributors as well as users), suppliers of material, labor, capital, equipment and work space as well as competitors (Dill, 1958). Aldrich (1979) uses the term rich or lean environmental capacity to denote the relative level of resources available to an organization within its environment. Competitive pressure and market conditions are important variables (Gruber and Marquis, 1969) as are information resources. General economic conditions may influence knowledge utilization (Duncan, W.J., 1972).

In summary, the field of external resources at the societal level refers to concentrations of resources, power, political domination and other organizations that sets limits to organizational discretion (cf. Aldrich, 1979).

Organization Level Variables

The socially constructed nature of organizations is strongly emphasized in the literature. Hansson (1979), discussing contingency theory and its emphasis on the adjustment an organization makes to meet changing environmental demands, stresses the multiplicity of forces, both internal and external, that influence the organization and its administration as well as its planning and decision-making processes. Analogously, organizations may be explored as continuing systems with a past, a present, and a future (Pettigrew, 1979). This open model is also reflected in the literature on organizations which focuses on effectiveness, survival and adaptation to changing environments (Aldrich, 1979). According to available studies, organizational change is a consequence of organizations interacting with their environments through reaction or through challenge. Organizing can be looked upon as a continuous process (Weick, 1979). Chandler and Hanks (1994) stress the importance of considering environmental influences when studying small firms since they, because of their small size, are very much influenced by the environment. Probably, small firms have a greater need to adapt strategies to environmental fluctuations than do large firms (Jennings and Beaver, 1997).

The literature on organization theory and research in the tradition of the rationality model strongly emphasizes strategic choice (a term introduced by Child, 1972) as the strategy governing this continuous process. In this view, the process is supposed to depend upon continuous decisions made by organizational participants, involving *variation*, which means a search for alternative goals and of methods of attaining these goals, as well as *selectivity*, referred to as a choice between the various alternatives (see Aldrich, 1979.) According to Aldrich, however, opportunities for strategic choice are often severely limited

because of the powerlessness of most organizations, barriers to choice caused by interorganizational dependence, and problems of perception and information processing. As a matter of fact, Aldrich states:

> Prior limits and constraints on available options leave little room for manoeuvring by most organizations, and strategic choice may be a luxury open only to the largest and most powerful organizations (1979, p. 160).

It can then be hypothesised that this difficulty has negative effects as far as to the process of information utilization and that small enterprises are particularly vulnerable in this respect.

Organizational behaviour is often of a more irrational character. Insights from cognitive psychology have inspired organization theorists to explain the irrational behaviour of organizations in terms of differing individual perceptions of reality (Cyert and March, 1992). Decision making is, contrary to the view of rational choice, seen as a messy, disorderly (Mintzberg, 1980) and irrational (Brunsson, 1985) process in which the decisions are difficult to distinguish (Mintzberg, Waters, Pettigrew and Butler, 1990).
As the following subsections aim to show, organizational behaviour can be viewed as a function of the interaction of personality, elements such as ability, values, goals, needs, expectations and other affective states, etc., with the general environment in terms of organizational contingencies, environmental constraints, available alternatives, and so on. Obstructing variables or barriers originating from all three levels of analysis form the constellation of forces that together make up the determining constituents.

The Field of Internal Resources

An organization or enterprise can be seen as a knowledge-processing system in which knowledge is the raw material in the production process (Wikström, 1994). In order to benefit from the environmental possibilities offered, firms must have the ability to perceive environmental changes and be able to take advantage of them (Davidsson, 1989; Stevenson and Gumpert, 1992). The firm's strategic orientation provides the energy for this process (Stevenson and Gumpert, 1992). Internal resources such as competence, knowledge and know-how can be obtained from outside sources (Birley, 1985; Johannisson, 1986). Another alternative or complement is networking with other people or organizations (Wiklund, 1998). In particular, the role of the manager is essential to small firms.

The performance of the enterprise, including its sensitivity to events outside its control, has been found to condition the content and flow of information to business management (Pollock, 1972). The whole body of competence available among the personnel in an organization is shown to be of utmost importance in this respect. Problem solving and developed self-knowledge are important prerequisites of organizational problem sensing and analysis. Glaser, Abelson

and Garrison (1983) found firm size and the existence of a technical or engineering group to be significant antecedent factors in the adoption of innovations and the utilization of knowledge. Smaller firms are especially exposed to the boundary created by size in this respect, quantitatively as well as qualitatively.

Lack of professionals and the absence of qualified technicians or well-trained labour are crucial for information transfer to small industries (Kirouac, 1981). Low technical capacity in terms of the degree of technical competence within smaller firms with few, if any, technically trained personnel causes a very high cultural barrier preventing them from using research institutes (Allen, Hyman and Pinckney, 1983). They often have difficulties understanding the work of such institutes, as stated in Chapter 5, Society Level Antecedents. According to Höglund and Persson (1983), the level of competency seems to be crucial to factual and desired contacts among small and medium-sized companies and, above all, to contacts with research institutes and universities. Different societal investigations in recent years have stressed that small firms are in urgent need of knowledge and skills (SOU 1991:56; SOU 1992:7).

The Field of Internal Preparedness

Organizations are purposive systems. According to Pettigrew (1979), purpose, commitment and order in an organization are generated both through the feelings, attitudes and actions of the entrepreneur or founder and through collectively developed meanings among its members. The whole system of such publicly and collectively accepted symbols, meanings, ideologies, beliefs, visions, rituals, myths, rules and so on, which have significant functional consequences for the organization at a given time, is often summarized in the concept organizational culture (Pettigrew, 1979; Alvesson, 1993; Schein, 1991). These basic values, beliefs and assumptions represent the managers' and employees' taken for-granted-view of the enterprise and its environment (Sveiby, 1994). According to Pettigrew (1979), they direct attention to the mobilizing of consciousness and purpose, the codification of meaning and the emergence of normative patterns in such a way that culture acts as a determinant of or a constraint to organizational action. They mobilise consciousness, evoke emotions and impel men to action through their action-impelling qualities.

The literature on intentional behaviour draws attention to goals and intentions as being the most immediate determinants of performance (Locke, 1970; Locke, Cartledge and Knerr, 1970). According to this view, goals are seen as direct antecedents of behaviour. Organizational goals, objectives and expectations take the form of an aspiration level that continuously changes in response to experience (Blau, 1963). Level of aspiration denotes a motivational standard that requires maximizing or allows satisficing to occur (March and Simon, 1993). Lewin et al (1944) described current aspiration as an optimistic extrapolation of past achievement and past aspiration. According to Cyert and March (1992), the actual aspiration level of an organization is elaborated over time in response to short-term pressures; that is, through a process of adaptation.

Accordingly, goals of organizations can be generated by or imposed on an organization by external forces as a result of interaction between the organizations and their environments (Aldrich, 1979). As stressed by Arvey and Dunnette (1970), people tend to choose those levels of performance as their goals which are most desirable and which they expect to be able to reach.

The literature emphasizes conflicts within organizations. There is usually limited ability to attend to all organizational problems simultaneously (Cyert and March, 1992), which often results in a conflict over priorities in the internal allocation of resources and between goals; an organization may have multiple or contradictory goals (Aldrich, 1979). Based on empirical evidence, Cyert and March (1992) distinguish between goals with respect to production, sales, market share, inventory and profit. The present study draws attention to a contradiction between short-term and long-term goals.

Resistance to change within an organization is another important determinant that touches upon the conflict perspective of organizations. On the basis of maintained opinions within organizational research, Wildavsky (1972) concluded that there is an inherent contradiction between the stability implied by organizational structure and the process of change. According to Östergren and Berg (1977), there is a tendency within organizations to protect themselves, which includes the interests of their members, their ideologies, their technologies, their organizational structures and the nature of their relations with the surrounding environment. Pfeffer and Salancik (1978) and Aldrich (1979) stressed the fact that organizations are inherently conservative, not only because of internal constraints exerted by existing structures, roles, beliefs, values and habits, but also because their involvement in external networks of obligations and exchanges, makes behaviour changes difficult. As regards the question of information utilization, Kirouac (1981) stresses that resistance to change or resistance to innovation is most common and most difficult to deal with. Beyer and Trice (1982) stressed that certain characteristics of organizations are major inhibitors of the use of organizational research.

Taken together, the large number of variables at work within the field of internal preparedness at the organizational level form a climate of readiness with respect to information utilization within the organization.

The Field of External Preparedness

Legislative and regulatory action are potentially problematic aspects of organization environments. The legal system of society sets constraints that limit organizational decision making and action (Aldrich, 1979). But government regulation may also act as a positive force or motivating factor (Gruber and Marquis, 1969). According to Sieber (1968), organizations differ in their vulnerability to environmental pressure. In a study of barriers to innovations, Piatier (1984) makes a distinction between general policy measures affecting all enterprises and measures to support innovation causing barriers

regarded as either general or relative. As regards information utilization, both kinds of barriers are important determinants.

It was noted by Aldrich (1979) that political stability and ideological legitimacy reduce environmental uncertainty, which in turn encourages future-oriented behaviour. In the same way, it is evident that a situation where environmental dependence and uncertainty are present constitutes an important external constraint on organizations (Duncan, R., 1972; Aldrich, 1979). Frequently, these turbulent environmental variables are obscure, unpredictable and out of control to administrators, often implying an inability to plan for the future (Aldrich, 1979).

The Field of External Resources

The environment, then, simultaneously provides opportunities as well as threats to small enterprises (Davidsson, 1989; Stevenson and Gumpert, 1992; Stevenson and Jarillo, 1990). The present conditions of the environment are often used to predict growth and performance in research. The small firm's perceived environment, particularly changes in environmental dynamism is shown to be of great importance to performance (Wiklund, 1998). Small firms facing increasing environmental dynamism tend to perform better. Miller (1990) stresses that in dynamic and unpredictable markets, firms have to innovate and adapt to rapidly changing demands. Perceived environmental hostility, however, can cause small firms to adopt a defensive strategy and dissuade them from taking risks, etc. (Khan and Manopichetwattana, 1989).

Research has shown that small, less technically advanced firms, seldom possess the internal resources necessary for the generation of new ideas, and therefore show much stronger reliance on outside sources than larger firms (Allen, Hyman and Pinckney, 1983; Schnek and Tordoir, 1984; Raffe, Sloan and Vencill, 1994).

Economy and capital resources play an important role in information utilization by small firms. Generally speaking, liquid resources are easily converted into other resources, which creates a flexible organization, while non-liquid resources tie an organization tightly to past practices (Aldrich, 1979). The literature studied also stresses that organizations characterized by depressed circumstances rarely possess the resources necessary for external search (Duncan, W.J., 1972). In this respect, small firms are shown to be especially vulnerable. Limited economic resources or financial barriers give no incentive for change, development or improvement; the firms cannot afford this. Analogously, costs have been demonstrated to form an information barrier of particular importance to small firms (Schnek and Tordoir, 1984 and others). The empirically proved difficulty of valuing information in monetary terms (Kirouac, 1981) makes this situation even worse, reflected in a lack of committed resources to gather, screen, store and assess information. On the whole, resources in terms of perceived capital availability, management size and

perceived size compared with competitors are found to influence the performance of small firms (Wiklund, 1998).

The theoretical view of organizations as activity systems draws attention to the fact that organizations possess a technology for accomplishing work, which creates a bounded set of interdependent behaviours and standard of operating procedures, whether it is a question of processing people or raw materials (Aldrich, 1979). Contrary to the case of larger industrial enterprises, which have a functional differentiation of special staff functions and units, most small industries have most staff functions combined in a single person, the manager himself (NOBIN, 1983). This implies a dispersed work situation for the manager and a decreasing degree of freedom to take organizational action such as information utilization. Nor do small firms generally have internal departments specializing in research and development information. Consequently, the availability of printed information resources is usually scarce within small industries. The way the firm is structured or organized to obtain and process what it needs to know is an important determinant of information utilization. According to W.J. Duncan (1972), the diversity of an organization and its task structures affect the rate at which new ideas will be generated and adopted. The very nature of industry thus proves to be a major barrier to information transfer (Kirouac, 1981). As pointed out by Perrow (1986), specific characteristics of organizational structures, such as favoured information channels, communication checkpoints and standard operating procedures, may impede scanning, filtering and pigeonholing activities.

Small firms usually operate on much shorter time scales than larger firms usually do (Capital Planning, 1982), reflected in generally felt constraints of time and space. From several studies it is clear that lack of time is a crucial barrier to information utilization within this target group. (See, among others, Allen, 1977; NOBIN, 1983.) There is also evidence that different time scales cause problems or limit their access to information because of the urgent character of the needs. It is a question of getting the right information at the right time in order to solve the problems.

Individual Level Variables

Giddens (1984) indicates the relationship between power and action, presuming that to be an agent is to be able to use one's power in different ways to cause desired effects. The following subsections aim to get closer into the ways in which such causal powers determine the degree of freedom for individual action.

The Field of Internal Resources

The know-how needed by managers of small firm to be successful covers different areas of knowledge (Bridge, O'Neill and Cromie, 1998). Bridge et al (ibid.)

distinguish the following dimensions: Functional knowledge and skills (including the technical knowledge and abilities appropriate to the business), business and strategic awareness, management knowledge and skills (including planning, organising, managing time, problem-solving, co-ordination of resources, etc.) and personal competencies (including leadership, result orientation, interpersonal skills, etc.). These authors also stress communication as the core skill:

> One skill often overlooked is communication - the ability to relate to and exchange appropriate information with the people who matter to the business, including staff, suppliers, customers, funders and advisers. It has been suggested that the traditional components of pre-start training, namely finance, accounting/ book-keeping, marketing/selling, etc., are secondary skills and that the core skill is communication. Communication is necessary in all aspects of small business development and is of particular relevance in building up and using an appropriate personal network of contacts (ibid., p. 114).

The basic skills, which are essential for people to be successful in their working lives and to be able to act in a complex, rapidly changing and highly technological environment, include in particular the ability to communicate, the ability to solve problems, the fundamental ability to search for, find and evaluate information in order to develop new knowledge and new skills, the ability of critical thinking and social competence (Atkinson, Spilsbury and Williams, 1993; OECD, 1996; Stern and Tuijnman, 1997; Tuijnman, 1997). Tuijnman (ibid.) stresses that the necessary core and subject skills have to be complemented by skills that can be summarized in the key competency - the ability to learn how to learn throughout one's life. However, from recent research it is evident that this is a basic dilemma. According to Argyris (1991):

> Success in the marketplace increasingly depends on learning, yet most people don't know how to learn (Ibid., p. 99).

These lines of thought are close to those of the information literacy movement originating from the American Library Association (1989) stressing that to be literate in the information age there is a need for skills in identifying an information need, searching for the information needed, evaluating the information found, organizing it and, finally, using it effectively (American Library Association, 1989; Breivik, 1992, 1998; Lantz, 1997). (Cf. Chapter 1) There is a need for better thinkers, problem solvers, and inquirers (American Library Association, 1989).

Personal characteristics such as age, sex, educational level, skills, experience, etc. are important determinants of information utilization (Vickery and Vickery, 1992). Knowledge gaps on the part of the recipient will either prevent or slow down the transfer of information (Kirouac, 1981). There is evidence to show that insufficient knowledge and know-how may lead to difficulties in defining and articulating the information need and may also lead

to irrational information search behaviour (NOBIN, 1983). MacInnis and Jaworski (1991) stress that the more knowledgeable the individual, the easier it would be to encode information which, in turn, might facilitate further information acquisition. Further, findings indicating that an individual's perception of his own knowledge influences the personal decision-making and information-seeking behaviour led Radecki and Jaccard (1995) to state that perceived knowledge is a central construct in the analysis of information-seeking behaviour, perhaps more than actual knowledge.

The degree of competency and capacity to search for and use information is an important determinant of information utilization. On the whole, there is empirical evidence of a general inability to cope with information needs among citizens (Dervin, 1976). From available research, a picture emerges showing that citizens are uninformed about public and private resources, facilities, rights, programs, etc. (Katz and Kahn, 1978), and that they are frustrated in their attempts to obtain information required for everyday problem solving. (See, among others, Katz and Kahn, 1978; Rieger and Anderson, 1968.) There is also empirical evidence showing that managers of small industries do not use conventional information resources because of their ignorance of available resources (Mick, 1981; Capital Planning Information, 1982; Höglund and Persson, 1983). Research has also revealed an unfamiliarity with useful models of information utilization as a guide for decision making and search behaviour among members of the relevant target group (NOBIN, 1983). In several works on the use of research results, Tydén (1993, 1994, 1995, 1997) stresses that different groups including managers of small firms are in urgent need of effective strategies to find the right information at the right moment in order to put research into practice. In other words, there is need for information literacy skills including computer literacy skills (compare what was said in Chapter 1, Information Use - a Requirement for Development). According to The American Library Association (1989) many workers appear to be unprepared to deal with the challenges of information technology equipment.

The individual's past experiences have also been demonstrated to be a major determinant of individual information processing (Neisser, 1967; Nilsson, 1986). An individual's information utilization can be viewed not only as a function of his present task and problems but also as a function of past experiences and patterns developed (Duncan, W.J., 1972; Höglund and Persson, 1980). Managers of small and medium-sized companies have often limited knowledge of libraries and their capacicy to meet information needs of this target group, whereas these libraries usually suffer from lack of experience of supplying information to the managers (Höglund and Persson, 1983).

Foreign-language barriers are generally very obvious in information transfer (Vickery and Vickery, 1992) and possibly particularly crucial in small and medium-sized companies (Rörååas and Vangen, 1982). But there is also another kind of language barrier shown as difficulties, caused by a difference in educational level, in using the same language or terminology as information professionals or technology experts (see, Rörååas and Vangen, 1982).

The Field of Internal Preparedness

The internal preparedness of the user is very much a question of motivational and affective states as important determinants and components of action control; that is, as regulators of information utilization behaviour. Most variables dealt with here reflect the degree of personal or emotional involvement in a situation of information utilization that determines the information needs of the user and his willingness to seek and accept information. (See, Vickery and Vickery, 1992.) According to Bull and Willard (1993) and Wiklund (1998) the attitudes of the entrepreneur are important to whether he recognizes and takes advantage of opportunities offered in a dynamic environment, for example, his desire to strive for sales growth.

The term motivation was used by Simon (1977) to designate that which controls attention at any given time. Carlson (1987) stresses that motivation can affect the *nature* of an individual's behaviour, the *strength* of his behaviour, and the *persistence* of his behaviour.

Motivation theorists stress the role of cognition in motivation. Thoughts, beliefs, expectations and other mental processes are shown to play a critical role by both energizing and directing behaviour (Deci, 1980; Bandura, 1982). Giddens (1984, p. 3) states:

> To be a human being is to be a purposive agent who both has reasons for his or her activities and is able, if asked, to elaborate discursively upon those reasons (including lying about them).

The fact that human actors are informed involves not only a continuous monitoring of their activities, but also a regular monitoring of social and physical aspects of their contexts. However, as noted by Giddens, there are motivational components of action that are not directly accessible to the consciousness of players, but nevertheless influence human action. (See, the description of motives, below).

As stressed by Thompson (1988), the social system provides individuals with a fairly consistent set of aspirations, beliefs about causation, and standards. He also argues that since both the individual and the situation he perceives tend to be patterned, we may expect the resulting behaviour to be patterned as well (Thompson, 1988). The importance of beliefs as determinants of human behaviour is further demonstrated by empirical evidence that many decisions are made on the basis of incomplete information or beliefs, prejudices, heuristics, ideologies, rules of thumb and the like (Tversky and Kahneman, 1974 ; Weick, 1979; Ungson, Braunstein and Hall, 1981; Wilson, 1981).

Goals or intentions in terms of action orientation are central directing factors of human behaviour (Stebbins, 1969; Magnusson, 1981). The goal works as an internal representation in terms of an anticipated result of an action and is the indispensable constant element of every goal-directed process (Hacker, 1981). According to Hacker (1981)

> goals are relatively stable memory representations that act as the necessary desired values in the comparison between the actual and the desired state during the implementation of an action (pp. 125 - 126).

Motives can be referred to as goal representations existing in a hierarchy according to Kagan (1972). Kagan distinguishes between two kinds of motives, primary and secondary, by pointing to the fact that a person possesses an enormous amount of cognitive representations of goals which are latent in the subconscious. Some of these can be activated into consciously experienced motives (primary), while others probably are subconscious but apparently able to direct behaviour (secondary). The two kinds of motives are reflected by their articulation, which means the degree to which the goal can be specified and assigned meaning by the holder.

> When a motive is ascendant in the hierarchy, the processing of information is selective in favor of the motive, and available action routines that can gratify the motive have lower thresholds. Ascendant motives orient the person to relate his experience to the goal and to seek out experiences that are likely to gratify it (Kagan, 1972, p. 61).

The hierarchical position seems to be determined by the perceived probability of gratification or success (Atkinson, 1958; Kagan, 1972). It is assumed that if an activated motive is continually frustrated, a lowered expectancy of goal attainment will develop that may possibly give the motive a subordinate position. Here, it is valuable to stress the distinction between success motivation and motivation to avoid failure (Eysenck and Keane, 1995).

Magnusson (1981) stresses the importance of environments and situations as arousers of expectations and reinforcement value to an individual. According to Saccuzzo (1987), optimistic expectations generally produce greater effort, while pessimistic thinking reduces motivation. Here, it is worth mentioning locus of control, which means an expectation concerning the likelihood that one's behaviour will lead to a desired outcome, as an important determinant. Another important determinant, emphasized by expectancy theories, is the value or attractiveness of a goal or outcome to a particular individual, the valence. Lawler (1973, p. 45) states:

> All of the (expectancy) theorists maintain that the strength of a tendency to act in a certain way depends on the strength of an expectancy that the act will be followed by a given consequence (or outcome) and on the value or attractiveness of that consequence (or outcome) to the actor.

The concepts of need recognition and demands are closely related to and reflect the concepts of goals, incentive or motive (Gruber and Marquis, 1969; Fiske, 1990). According to Wilson (1981, p. 7), the focal point of information need is the question

> *why* the user decides to seek information, what purpose he believes it will serve and to what use it is actually put when received.

On the basis of evidence from the field of psychology, he distinguishes three interrelated categories of need which an individual may seek to satisfy: physiological, affective and cognitive needs. These needs, referred to as the root of motivation towards information-seeking behaviour, arise out of the roles an individual fills in social life of which the most relevant one is the work role (Wilson, 1981, 1994). Gratification theory suggests that people search actively for information to gratify their needs (Rubin, 1986).

Mick (1977, 1979) distinguishes between two general types of information needs in the industrial context, referred to as applicational and nutritional. The former needs are problem-oriented, directed towards solving specific problems, while the latter are more diffuse and abstract, aimed at implementation some time in the future or at increasing general knowledge and competence.

Analyses of innovations suggest that a user's awareness of his needs is important, either because of its stimulating effects on innovation, and, because innovations create needs (Rogers and Shoemaker, 1971; Zaltman, Duncan and Holbek, 1984). Indirectly, awareness seems to be reflected in an increased demand for and improved information utilization (Beyer and Trice, 1982). Consequently, a low awareness of needs or the prevalence of unarticulated needs might cause a decrease in demands for and use of information. According to Meindl (1982), the utilization of organization research will depend on the degree of self-assessed needs, so that the greater the need felt for external solution seeking the larger the probability that utilization will occur. According to Taylor (1968) and Kirouac (1981), the difficulty or inability to define real needs is a crucial barrier to efficient transfer of technology. In the view of Dervin (1976), the perceptions of needs may act as barriers to the accessibility of information, either because of an individual's unawareness of his needs or his inability to verbalize them or, despite his awareness, because of his neglect to see them as information problems.

Affective reactions refer to subjective or personal feelings and attitudes triggered by users of information. Empirical findings indicate that users are resistant to information that does not agree with their expectations, values and experience (Weiss and Bucuvalas, 1980), is critical to what they have been doing (Campbell, 1969), or threatens the stability of cherished beliefs and world views (Zusman, 1976, p. 1303). Exploring the idea of selective exposure, Rogers (1962) suggests that individuals generally tend to expose themselves to ideas that are in accordance with their interests, needs or existing attitudes and consciously or unconsciously avoid things that are in conflict with their predispositions. Moreover, the results of the present study indicate that the choice or unwillingness to choose a channel or supplier is largely governed by the expectations and values attached to different sources; choice seems positively related to favourable reactions, while unfavourable reactions are likely to cause non-use. Also in line with these suggestions is the assumption made by Meindl (1982) that the willingness of practitioners to utilize a solution

is determined by the values, favourable or unfavourable, they assign to that particular solution. Two important factors which affect the choice of source are ease of use and accessibility (Gerstberger and Allen, 1968); individuals behave according to a simplified law of least effort suggesting a choice of the most favourable sources with respect to the cost in terms of physical and psychological effort. Information utilization is, therefore, to a large extent, a consequence of how an individual appraises or evaluates different sources and channels. Here, it is important to stress the importance of an individual's past experiences to his choice of source. Bad experiences with former information contacts have been shown to impose a barrier to the future co-operation of a small firm with information suppliers such as, for example, universities (Schnek and Tordoir, 1984).

With regard to the utilization of research results in practical settings, the research literature draws attention to the cultural differences between researchers and users. The fact that they belong to separate communities with very different values and ideologies (Dunnette and Brown, 1968; Duncan 1974; Dunn, 1980, Rothman, 1980) as well as role perception and status (Duncan, W.J., 1972; Wilkin, 1977), is found to impede utilization. It has, however, been suggested that social contact decreases the culture gap and that developing linking roles between the two systems might bridge the gap (Havelock, 1969). (Compare with the subsections Society Level Variables and Organization Level Variables)

The Field of External Preparedness

Social and cultural factors found in the external and internal environment of an organization affect individual information utilization. As noted by Aldrich (1979), political stability and ideological legitimacy reduce environmental uncertainty, which in turn encourages future-oriented behaviour, and vice versa.

On the basis of what he found from empirical work, Beryline (1966) pointed out that a desirable level of uncertainty seems to stimulate individual information-seeking activities. Consequently, as hypothesised by Ungson, Bernstein and Hall (1981) there is a crucial threshold of perceived uncertainty for each individual, a point where stimulating and directing effects turn into a dysfunctional overburden. The awareness that an uncertain situation has been encountered may make individuals feel uncomfortable when they are unable to resolve their uncertainty. Kagan (1972) stresses that when the person cannot cope with perceived uncertainty in terms of assimilation, removal or action, affective distress emerges. Physiological stress, environmental disruption and unpredictability create great psychological uncertainty and insecurity (Kiesler and Sproull, 1982), which is a mood of crucial importance to human creativity (Glaser, Abelson and Garrison, 1983). As these authors stress:

> When people feel anxious and threatened, they tend to regress to past patterns of action associated with more security (ibid., p. 79).

In the case of information utilization, this fact implies a stereotyped information-seeking behaviour involving the use of familiar and prepossessing channels and sources. For example, there is empirical evidence that individuals in technical service projects tend to take changing environmental conditions (environmental turbulence) not as uncertainty to be dealt with, but as a source of information overload or threat with negative influences on their communication structure (Streufert, Suedfeld, and Driver, 1965; Driver and Streufert, 1969).

The Field of External Resources

The field of external resources at the individual level reflects to a large extent the degrees of freedom available to the individual user in environmental and organizational circumstances.

The first issue to be dealt with here is the information use by small-firm managers, including informal and formal contacts or information resources. Since the managers of small firms are the subjects of the present study, their usage of information is also very much the usage of the enterprises themselves and could have been presented at the organizational level.

Weick (1995) points to the fact, that generally, individuals do not lack information but suffer from not being able to orient themselves and create meaning in a situation characterized by information overload.
Small firms in general depend more on informal sources based on linkages with customers, suppliers, competitors, etc. (Wiklund, 1998; and others). There are, however, considerable quantitative differences between individuals as regards the amount of sources used. There is empirical and theoretical evidence that individuals tend to behave according to fixed models when dealing with information utilization activities. This results in a personal rather stable information-seeking style (Rubenstein, 1970). Ginman (1983, 1987) uses the concept of information profile as a measure of the personal quantitative procuring of information. This style seems rather stable over time under similar conditions in a given situation, but changes when the factors regulating the profile change. These conditions include the personal characteristics of the user (such as education and affective states) as well as factors originating from his working role and the surrounding environment. Most of these variables have been dealt with in the subsections above.

According to Wilson and Walsh (1996) economic issues related to information utilization are of two kinds: direct economic costs, and the value of time. The present study indicates that economic variables in both respects are crucial determinants of the degrees of freedom of individual action.

The user (in this case, the manager) must always work with an element of risk in the information situation and keep the profit motive of the firm permanently in mind. Economic considerations with respect to the effort of manpower and time devoted to information utilization activities as well as to other costs must always be taken into consideration and priorities made in each situation. Particularly in times of stress, economy seems to cause the individual user great

problems in filling his information needs. He must base his decisions on an image of the problem situation at hand, and he cannot afford to make mistakes. The scope for action is further determined by the time available for information-seeking activities. With their dependence on crucial influences of organizational and environmental factors, managers of small enterprises seem particularly often to lack time which forces them to utilise unsatisfactory information sources. In their research, Payne, et al (1988) focused on how decision-makers varied their strategies for decision-making according to the pressure they were under. They found that time pressure was crucial to the way in which the decision-makers under severe time pressure changed their information processing strategies, accelerated their processing and focused on only one subset of information. To a large extent, these difficulties spring from a dispersed working-role and the very nature and structure of the organizational setting within its environment. Thus, the individual's perceived power of choice and capacity to make adjustments to a changing environment become strongly restricted with crucial negative effects on his information usage. Because of lack of time, strategic planning is one of the most neglected activities in most small firms (NUTEK, 1996; Johansson, 1997); the small firm's possibilities of adapting its strategies to changing environmental demands are counteracted by the fact that the manager is too stuck in today's work to be able to think strategically and plan for the future (Kubr, 1996).

The Cognitive Processing of Information Barriers - a Conceptualization of the Effects of Barriers

To be able to arrive at a profound understanding of how information utilization is affected by perceived information barriers in a given situation (see, Chapter 1, Determining the Objectives of the Study), it is necessary to consider how information barriers are cognitively processed. This means focusing on the mental representation a person creates of barriers and the way this internal picture is manipulated in the mind and acted on. The purpose of this section is to provide such a framework that promotes an interpretation of the results of the present study as well as a comprehensive understanding of the problems of information barriers. The text in this section should be seen as a promising theoretical framework into which the data obtained fit very well.

According to Magnusson (1978) and Endler (1981b), environmental stimulation affects behaviour in terms of an interaction between perceptions of the actual situation with previously stored information based on past situations. Magnusson stresses that it is always the present situation that mediates the total environmental influences. Consequently, the environment as known by the individual is a cognitive representation in the individual's mind created by perceptions, interpretations and generalizations of present and past situations. (See James and Sells, 1981.)

Psychological research on memory and cognition may further add to an understanding of the information barrier problems and their effects on the individual's information utilization. The research referred to in this section

focuses on information processing in terms of encoding, retention and retrieval. According to Tulving (1985), these three processes are the constituents of a definition of memory. Encoding refers to the process of getting information into memory by transformation into an internal representation. Retention denotes the storage of information for later use. Retrieval, finally, is the extraction of previously encoded and stored information or experiences so that it is brought into a conscious, activated state. Thus, memory is the capacity that permits us to benefit from past experience (Tulving, 1985).

Nilsson (1980, 1984, 1986) and Nilsson and his co-workers (Nilsson, Mäntylä and Sandberg 1987; Nilsson and Sandberg, 1987) regard remembering as an interaction between the cognitive capabilities of the individual and the demands of the task in a particular situation. In other words, emphasis is on the dynamic interaction between the environment and the individual. This theory of memory functions seems promising also when the aim is to reach a proper understanding of the interaction between the cognitive system of the user and the information barriers he encounters in an information setting. This refers to the importance of the cognitive meaning of information barriers to information utilization behaviour.

Analogously to the theory proposed by Nilsson and his co-workers (Nilsson, 1986; Nilsson, Mäntylä and Sandberg, 1987), I propose a conceptualization of the effects of information barriers on an individual's information utilization as a dynamic interaction between the environment and the organism in terms of the cognitive system of the user and the information barriers he encounters in an information setting. The activity I refer to here is the cognitive processing of information barriers, which means encoding, storage and retrieval. In this process the individual is seen not as a passive receiver but as an active interpreter of physical events and a processor of information, continuously interacting with the environment on the basis of his earlier experiences, knowledge and expectations.

At the environmental level, every specific information setting is supposed to be comprised of various physical *features* reflecting limiting and obstructing conditions of the events and objects involved (for example, about the usefulness, effectiveness, etc. of libraries and the availability of information resources). These characteristics combine to form *affordances* of varying strength, which together refer to the total information provided by the environment about crucial information barriers; in other words, the to-be-remembered information about a situation with respect to information barriers (cf. what was said by Nilsson, Mäntylä and Sandberg, 1987).

If we return to the model proposed for analysing the information barriers (see Chapter 2, Analysis Model) and examine the three contextual levels, it is evident that from the individual's point of view, all four domains of information barrier conditions at the societal and the organizational levels can be described in terms of features and affordances. The same is possible for the fields of external preparedness (Field 3) and external resources (Field 4) at the individual level, while the fields of internal resources (Field 1) and internal preparedness (Field 2) refer to cognitive capabilities and affective states of the individual.

At the individual level, each information barrier feature of the environment activates one particular unit or *point* of the human storage system. Furthermore, a number of points can be activated indirectly by means of associative connections forming *aspects* of the current situation as experienced by the individual and combining to form the *functional dispositions,* a kind of means or guide for the person to pick up information about information barriers available in a situation to be integrated with his previous knowledge and experience. Nilsson (1986) states:

> ... a functional disposition is a wider and more complex activity pattern than an aspect, and the functional disposition means a readiness in its most global sense for the individual to act in accordance with what the current object or event has to offer. At any given moment the rememberer is prepared to act, or in other ways deal with the situation, on the basis of the affordances conveyed by the object and the functional disposition activated (p. 363).

Functional dispositions can be compared to what De Mey (1982) calls world views or world models, referred to as representational models of physical events with some sort of builtin filters or selective windows for perception and action. Analogously to the functioning of aspects and functional dispositions, it is postulated that there is not one world model in our minds, but a multiplicity of world models or micro worlds systematically interlinked in certain ways.

As stressed by De Mey (1982), every situation requires a certain amount of knowledge if we are going to behave in it so as to direct our information processing as well as to govern our action. Analogously, information utilization requires some kind of guidance based on conscious reflection as well as on a more unconscious or automatic internal analysis of what we know about the problem situation at hand. The required knowledge is reached through a personal process of cognitive processing and interpretation which results in a kind of internal model, world view, of the nature of reality. The model, composed of a varying set of cognitive structures, specifies what kind of behaviour is appropriate in the situation at hand by providing a limited set of possibilities both with respect to what we should look at or search for and to our course of action. According to De Mey, "world models" usually include relatively stable routines for action, a kind of "tacit knowledge", often embodied in practical skills and patterns of perception.

The theory outlined above gives rise to a distinction between two kinds of information barriers, on the one hand subjectively perceived barriers and on the other, objective or absolute barriers. The important question is, then, whether there is a difference between the two with respect to their influence on information utilization.

To answer this question, it is valuable to consider the work of Svingby (1977, 1978) who discusses the importance of the perception of formal limits in the context of planning secondary school education. By giving three hypothetical examples, she points to the fact that there is usually a certain

relationship between the subjectively perceived space for action and the degrees of freedom to act available within the formal frames of action. The examples indicate three possible alternative relations:

a) the subjectively perceived space for action might, in essential respects, correspond to the formal one;
b) the space for action can be perceived to be so limited that only a smaller part of the formal space seems available to use;
c) the subjectively perceived space for action might exceed the formal limits.

The examples illustrate that there is usually no exact correspondence between the formal boundaries and the perceived space for action. According to Svingby (1977) a situation consistent with case (b) is fairly common. The importance of this distinction is further indicated by André-Eklund (1983) in a study of the freedom to act and the space for professional actions of the teachers and the corresponding freedom of the students within the teachers' space.

These lines of thought imply that the perception of the individual possible space for action within the frames of barriers becomes important to his or her information utilization behaviour. Absolute barriers can be referred to as determining outer boundaries of an information activity: economic resources have ebbed out, materials are lacking and cannot be replaced or substituted, laws and regulations put an end to information utilization and so on. However, the individual information-seeker or user perceives these limits much earlier. He may hesitate when he encounters resistance, for example, in terms of government regulations, physical availability of information or unfavourable values assigned to sources or channels as well as lack of money, education, space, etc., or when he believes something similar will appear. In this way, a situation appears in which the space for action is perceived to be so restricted that only a small part of the space before the absolute boundaries seems possible to use. Consequently, these perceived or covert psychological frames are extremely crucial to information utilization. They have the power to restrict an individual's information search, acquisition and use so seriously that the usable space is not used. (Cf. the arguments of Svingby, 1977 and André-Eklund, 1983.)

The preceding theoretical discussion gives an explanation of the fact that different individuals tend to develop certain habits or perhaps varying cognitive styles with respect to information utilization. The representational model or the functional dispositions set limits to the scope of perception and action in a way that can be compared with the functioning of paradigms as cognitive means of orientation in the conduct of research (Kuhn, 1962; Lantz, 1988). Consequently, it can be concluded how extremely important our stored information about information barriers to events and situations in the past for present and future information utilization behaviour is. De Mey (1982) stresses:

> ...we should realize the extent to which all of our behavior is guided by stored knowledge in comparison to external knowledge acquired on the spot (ibid., p. 19).

According to Hacker (1981), cognitive or memory representations are the decisive link to mental control of actions guiding all phases of action.

In summary, then, the information user's information utilization activities are based on or controlled by his situational perceptions and memory representations with respect to information barriers. An individual's internal representations of the situation at hand can be referred to as the material from which the decisive steps of information processing and action are performed. (See also Hacker, 1981.) The quality of these representations determines the selection and orientation of action programs in such a way that they serve as instruments for prognostic evaluation of the consequences of possible alternative steps and decisions to be taken on the path. The perceived barriers originating on different contextual levels and distributed across the four fields according to the proposed model (see Chapter 2, Analysis Model, Figure 2) are extremely important constituent elements of these cognitive representations.

Chapter 3

Methodological Considerations

This chapter aims to present methodological considerations taken in drawing up the plan of the study by placing the latter in the perspective of data collection techniques and discussing qualitative research, action-oriented research and the case study approach.

Qualitative and Quantitative Research

For a long time, the established way of conducting research in education and psychology was similar to that of the natural sciences. According to Haslerud (1979), well-established methods and perspectives in science have been transferred without consideration of their relevance to the humanities. Researchers within this paradigm influenced by natural science have therefore studied human behaviour in essentially the same way as phenomena in physics and have above all tried to clarify universal problems, for example, various aspects of a population's general or average situation, by studying samples using quantitative (statistical) methods. The awareness of limitations in the traditional perspective of studying human behaviour has become increasingly acknowledged (Smith, 1989) and a new, alternative paradigm is slowly emerging, accentuating data that are not to be treated by quantitative methods (Haslerud, 1979). At the starting-point of this project, the traditional perspective dominated educational research, even if other than positivistic approaches were used. This implies a situation characterized by paradigmatic conflict.

When comparing traditional research and research according to the alternative paradigm, some important differences as regards the perspective of research can be pointed out, according to Haslerud (1979) and André-Eklund (1983). In the alternative paradigm, the importance of the social environment to human behaviour is emphasized, whilst in traditional research the researcher tries to control external, influencing factors. Individual differences are also emphasized and related to the individual case, not conceived in terms of statistical distributions, as in traditional research, where understanding of the individual's situation becomes secondary. A strong tendency in traditional research is to exclude environmental factors in contextual divergencies and individual variations; researchers simply try to eliminate them and thus lose an essential part of reality (Lundman, 1979). Haslerud (1979) finds that the one-sided view taken when choosing method has resulted in psychological science developing a theory system which is difficult to relate to everyday reality.

Recent educational research emphasises, however, a contextual perspective of learning including theories of, above all, situated learning (Lave, 1988; Lave and Wenger, 1991; Chaiklin and Lave, 1993). This theoretical view emphasises

the situated nature of learning; knowledge is not independent but fundamentally situated, being a product of the learning activity, context, and the culture in which it is developed and used. From this point of view, learning is a socially constructed process situated in the culture in which people act (their lived-in world), negotiating meanings and constructing understanding; it is constituted in relation to other aspects of the lived-in world and progressively developed through activity throughout the life of the individual (See also Habermas, 1987b). Understanding constantly changes through the individual's interaction with the lived-in world and the meaning created and made sense of in this process. Therefore, according to Larsson (1997), learning can be conceived of as an ongoing process of revision of meaning.

The most common term used for the research that corresponds to the progressing paradigm of research is the notion of qualitative research and qualitative analysis. Unfortunately, use of this notion is somewhat confusing in the literature. Mainly, this confusion seems to depend on the fact that using this concept involves a technifying view of the problems, focusing primarily on methodological matters rather than on the vision or the paradigmatic thoughts guiding research.

According to Kuhn (1962, p. 108), paradigm means "theory, methods, and standards, usually in an inextricable mixture", that, taken together, form a scientific perspective involving certain expectations and norms of action. In the concept of paradigm there is a belief or motivating force that becomes a guiding function, some sort of cognitive model or world view governing the behaviour of researchers (De Mey, 1982).

In an analysis of paradigm and reality in educational research, Popkewitz (1984) focuses on three different, competing intellectual traditions or paradigms: empirical- sciences, symbolic sciences and critical sciences.

Empirical- sciences correspond to the natural-science oriented traditional research. The purpose of study is to develop theories (reminding of natural laws) of social behaviour from observations in which individual behaviour and the social world have been reduced to a system of variables. The developed theory should be universal and not bound to specific contexts. The heavy reliance on quantitative data and mathematical models has given rise to the notion of quantitative research.

Symbolic sciences refers to the kind of research that has been called interpretative, hermeneutic or, using the loose technical term, qualitative research; in other words, corresponding to the progressing paradigm in Haslerud's vocabulary. The purpose of symbolic sciences is to develop a theory of social affairs through analyses of social situations aiming at an *understanding* of the underlying conditions. The notion of symbolic refers to the fact that the unique quality of being human is found in the symbols people invent to communicate meaning and to form conceptions about their individual situation and the surrounding world. Further, emphasis is placed on the specific situation. Uniqueness and individuality become important features uncovered through a sharp focus on the interactions, beliefs and patterns of behaviour produced in a particular setting. Symbolic sciences also stress a holistic perspective of the

problems studied, which can be seen as a reaction to the patterns of specialization and fragmentation of empirical sciences.

Critical sciences denotes research with the goal of unravelling or demystifying social conditions that restrict individual and social life. It is a question of unmasking structural constraints and contradictions that exist in society as well as making individuals aware of their situation and changing social reality. This perspective of research relies heavily on Marxist ideology and uses Marxist theories for the interpretation of the dynamics in society as a guideline for bringing about social change.

According to Popkewitz (1984), the development of these three traditions or paradigms must be related to circumstances in the general contradictions and transformations that occur in society. He argues that the symbolic sciences developed as a science of education from such anomalies with solutions out of reach of empirical behavioural sciences and also as a response to the enormous technological developments of society which had not been able to satisfy the spiritual and emotional needs of people. (Cf. the ideas expressed by Haslerud, 1979.)

From the perspective of production of the total body of scientific knowledge, it is important to stress the complementary functions of different paradigms of research (Habermas, 1987a; Popkewitz, 1984). These complementary functions refer to the ability of the approaches to serve different phases of knowledge generation: to generate hypotheses, and to confirm or falsify hypotheses. In Habermas's view, there is a close relationship between different interests of knowledge generation and these complementary functions. In his terminology, this means a linkage between an interest in technical control and an interest in empirical-analytical sciences, between an interest in understanding and an interest in historical-analytical sciences (comparable to symbolic sciences), and finally between emancipation and critical sciences. All these perspectives contribute to a better understanding of the world around us by providing different kinds of knowledge, quantitative or qualitative.

The perspectives differ with respect to the object of study depending on diverging goals. Thus, in empirical-analytical science researchers share already existing conceptions of reality directing their work towards generating scientific knowledge within these frames. The focus is on finding effective ways to reach a given goal. Symbolic scientists, however, accept a sceptical attitude towards general assumptions and seek to understand the true significance of reality. Critical scientists, in turn, believe that they have found these dimensions and want to change reality itself in this direction.

Depending on different stages of knowledge development within the perspectives, the purpose of symbolic sciences has so far been mainly explorative and hypothesis-generating, through an attempt to understand the underlying dimensions of the problems and to develop patterns or models of thought, while empirical sciences aim to verify the hypotheses generated by symbolic sciences. (See Cronbach, 1990; Eklund, 1987.) It is, however, possible to carry out hypothesis-verifying studies as well. Both phases are of equal importance in the total research process.

Research on information utilization could obviously be assigned to the traditional, quantitative research paradigm. Consequently, predominantly general problems have been studied by means of quantitative methods, which means that knowledge has been built on average situations, providing mainly cursory data. Unfortunately, the body of research has not only shown short-comings of one-sidedness in respect of perspective of research and knowledge interest; it has also suffered from a lack of theory and inadequate use of quantitative methods (Paisley, 1965; Paisley, 1968; Atherton, 1975; Wilson, 1980, 1994).

Owing to the fact that quantitative studies dominated research on information utilization, there is a need to change the direction towards the progressing, alternative research paradigm. Knowledge about the general, average situation needs to be supplemented by knowledge and understanding acquired thanks to in-depth studies of situations. Since there is much evidence that information utilization is dependent on contextual factors, we need research where social and societal circumstances are taken into account. (See Wilson, 1980.) In addition to the existing generalizing investigations, we need intrinsic studies which can create an understanding of human information situations from the perspective of contextual factors (Atherton, 1975; Thunberg, 1982; Wilson, 1980, 1994).

We need research that considers discrepancies and variations in human information situations: more symbolic research concerned with the individual's situation in society. Research must be directed towards creating theories explaining the interplay between information utilization and the societal context in stressing information utilization as a societal process.

With a shift in research approaches in favour of symbolic sciences, or qualitative research as well as qualitative methods, we might be able to complement the sometimes meagre and ambiguous results with profound knowledge and understanding of natural information situations, where obstructing barriers and problems can be scrutinized and considered in the planning of information services. The present study can be seen as an attempt to satisfy these needs.

In line with the methodological considerations given above, it can be concluded that this study should be carried out according to the qualitative perspective of symbolic sciences aiming at an understanding of the problems of information barriers by uncovering underlying dimensions.

The qualitative point of departure does not preclude the use of quantitative techniques of data analysis. Recent literature on methodological matters lends support to such a mixture, arguing for an epistemological continuum rather than a strong dichotomy between the two paradigms which some authors call quantitative and qualitative research (Smith and Louis, 1982; Miles and Huberman, 1984). In this study, however, data are analysed quantitatively only for descriptive purposes, as a further elucidation of the problems of information barriers. Consequently, this data analysis does not imply that we leave the perspective of symbolic sciences for the perspective of empirical behavioural sciences.

Action-Related Research

This study uses an action-related approach. In order to make a distinct description of this methodology, it is of value to use a classification of educational research as the point of departure.

The literature on methodological matters predominantly concerns methodologies within the traditional, positivistic paradigm with some fluctuations between the classifications made by different authors (compare among others, Travers, 1978; Kerlinger, 1986; Mouly, 1978; Dyer, 1979); a certain degree of arbitrariness seems to characterize the process of classification (Berglund, 1983). Generally, the basis of division is methodological. An exception to these works is the classification of Werdelin (1979, 1982) which bridges traditional positivistic research and alternative approaches.

Werdelin classifies educational research along the dimension of the degree to which the research activities are executed in accordance with a design determined in advance. According to this principle, two broad categories of research appear, studies conducted in accordance with and strictly following a rigid plan determined beforehand, and studies using an open or flexible model characterized by action-reaction involving flexibility and adjustment based on what happens during the research activities. The former category forms what is generally called traditional or classical research. Werdelin places action-related research in the latter category.

Action-related research falls within the "progressing paradigm" and is characterized by an open model involving the assumption that it is possible to augment it as the work proceeds, to bring in new variables or new groups of individuals and so on (Werdelin, 1979, 1982). Consequently, from the beginning of the research activities, only a preliminary design exists which is then changed or developed during the process to be able to solve the research problem as successfully as possible. This is a fundamental difference from traditional research.

Werdelin (1982) distinguishes two types of action-related research based on whether or not the study aims to change the social situation studied. These are observational research with no intention of causing a change, and research using a systematic strategy for change. The latter category covers the approaches of action research and participatory research, where the latter can be viewed as a further development of the former. The main difference between the two approaches lies in the fact that the aims of a project of the latter category and other decisions concerning the research process are always made by the participants themselves.

In order to arrive at a more distinct positioning of this study it is of value to use a second dimension in the further analysis, namely, one that specifies the origin of the goals behind a research activity. For this purpose, the segmentation of internal goals - external goals suggested by Werdelin (1979) will be accepted, but used differently. Werdelin referred to the goals behind a study in terms of the kind of knowledge the research aims to develop. In this study, on the other

hand, it is a question of who determines the goals of the research activities. This changed definition brings a perspective of philosophy of science or science of science into the discussion resulting in an alternative interpretation compared to the one given by Werdelin.

By combining the two proposed dimensions we arrive at a model of classification (Werdelin, 1979) which divides educational research into four fields:

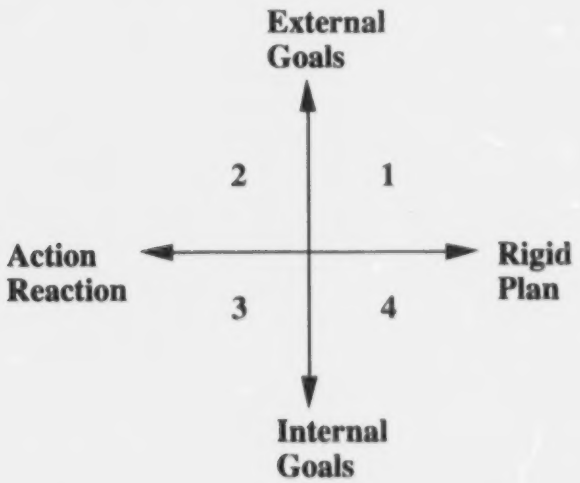

Figure 4. Model for Classification of Educational Research (Werdelin, 1979, p. 17).

Field 1 encompasses research following a rigid design drawn up in advance and characterized by external goals. The goals behind these research activities are often determined in terms of societal intentions as to the need for solving certain societal problems and stimulating different sectors of society or by order of various customers. This category includes traditional research, which aims at solving existing practical problems or at reaching stated goals. Consequently, the focus of research most often becomes one of solving problems for implementation in practice, rather than one directed towards internal disciplinary growth; internal interests of a discipline are subordinated to those of external interests. A substantial part of the total body of research is of this kind.

Field 2 covers research distinguished by external goals and an open model of research characterized by action-reaction. According to the discussion above, action-related research of both types, research with no intention of change as well as the kind using a systematic strategy for change of the social situation studied, belongs here; in other words, both observational research and action research belong to this field.

Participatory research covering the dimensions of internal goals and an action-reaction related plan can be assigned to field 3. According to the definition of participatory research above, the goals of such studies are internal in that they are always determined by the participants themselves.

Field 4, finally, covers research characterized by a rigid plan and internal goals. According to my definition of goal origin, classical research in terms of basic research directed at paradigmatic growth often belongs here; it is a question of a purely internal scientific development from a paradigmatic perspective. The notion of paradigms refers here to internal models, cognitive structures which give shape to the scientific expectations that guide the research of normal scientists during normal science periods according to the Kuhnian discontinuity model of scientific development (Kuhn, 1962). Carrying out basic research can be characterized as a puzzle-solving activity in which the prevalent paradigm is the matrix or plan for the game that specifies the prerequisite knowledge necessary for scientific growth (De Mey, 1982). Research within this field is, consequently, governed by internal goals of the scientific community directing researchers to study problems of disciplinary paradigmatic importance.

From this discussion some conclusions can be drawn with implications for the present study. First, according to the classificatory model above, it is clear that fields 2 and 3 correspond to the notion of action-related research. Secondly, as noted earlier in this chapter, my study of information barriers uses an action-research approach characterized by an open design as well as by the external goal of bringing about changes in terms of minimizing information barriers. Accordingly, in a holistic classificatory perspective of educational research, the exact position of this study is within field 2.

This classification was based on the fact that the researcher was the initiator of the research with responsibility for goal determination and other kinds of decision-making during the course of the project. It must, however, be noted that the decisions involved in both the planning and execution of the developmental work included in the study were based on a dialogue between researcher and participants. Further, the origin of the project can be seen in the light of an emphasis by society on the need to stimulate information and technology transfer to small and medium-sized companies, which, for example, was made explicit by the funding of this project. (See, Chapter 1.)

In the present project on information barriers the researcher, besides being research manager, became a catalyst, a dialogue partner, a resource person, a teacher, a change agent; in other words, she was responsible for the research as well as being an active participant in the change and development process. The role of the supportive researcher can be summarized as the one who observes, analyses and describes, as well as the one who mediates between these descriptions and the developmental work, the intervention. (Compare with what is said by de Vries, 1981.) The responsibility of the participating managers in the present project is to serve as a guiding function with respect to the design and execution of the intervention (see further, Chapter 8). To improve the effectiveness of the developmental work, it was found essential to be responsive to the particular needs of the group studied (see Lewin, 1947). Accordingly, the intervention processes of this study were designed and executed on the basis of real needs and perceived problems obtained in a close dialogue with the participating managers (see also Chapter 8).

The methodological implications of the idea of collaborative research concern the fact that the relationship between researcher and subjects must necessarily affect the outcomes of the research (Orne, 1962; Rosenthal, 1976; Argyris, 1968, 1976). As regards the final effects on the reliability and validity of research data there is, however, little or no direct evidence, even if some authors have speculated that the collaborative and supportive researcher loses his independence as an observer, which might constitute a potential threat to his objectivity (Ellström, 1984). On the other hand, there is evidence in the research literature that the data collected by means of collaborative research is more valid than those obtained by other means (Argyris, 1968, 1976). As noted by Trist and others (1963), there is even a risk that the cold objective researcher might not be allowed to penetrate the system at all. In the present study, it was found necessary to establish a collaborative relationship in order to arrive at an interpretative understanding of the information barrier problems. The methodology chosen made it possible to get closer to reality, that is, the subjects' subjective opinions, beliefs and behaviour; in the terminology of Argyris and Schön (1977), to reach an understanding not only of the espoused theories of the individuals studied, but more importantly of their theories in use. It is doubtful whether such an understanding can be reached by other means.

The Intervention in the Perspective of Organization Development

In this investigation, a distinction was made between two types of programmes, on the one hand a training programme focusing on the individual and on the other, a programme focusing on the organization. This distinction is similar to the one made by Bennis (1969) in terms of personal change or self insight and organizational development. Chin and Benne (1969) prefer to make a distinction between "releasing and fostering growth in the person" and "improving the problem-solving capabilities of a system". Fullan, Miles and Taylor (1980) talk about "partial forms of OD-related activities" and Derr (1976) uses "organizational training-OT" when discussing a training programme focusing on the individual.

Hultman (1983) describes the latter type of training programme as a programme primarily located outside the organization with an external change agent working together with one or a few individuals from the organization. He also states that a programme focusing on the organization is one located inside the organization itself with an external change agent working together with an internal agent who gradually assumes increased responsibility in the change process. Depending on the degrees of freedom for developmental activities determined by the frame factors (above all, limited economic resources), the training program in this particular investigation is of the former kind, focusing on the individual; in other words a human processual kind of intervention with the main aim of affecting individual knowledge, insight and perceptions or affective states (Friedlander and Brown, 1974; Ellström, 1984). Implementing an intervention in terms of genuine organization development as defined above was

not possible within the existing frames. (For an account of the frames factors, choice of intervention, the goals of the intervention chosen and its quality characteristics, see Chapter 8.) This means, that the intervention of this project has been restricted to focusing on only two fields of the proposed model for the analysis of the information barrier problems, the field of internal resources and the field of internal preparedness, and also on only one contextual level, the individual level. (Compare with the proposed analysis model presented in Chapter 2, A Description of the Three Levels of Analysis According to the Model.)

From a dissemination point of view, the intervention of the present study is related to the well-known temporary system model (see, e.g. Miles, 1964, 1968; Havelock, 1969), which implies that the participants leave their normal working place to attend an external program of a temporary character. This model allows for alternative ways of action with regard to principle of education as well as to principle of dissemination; On the one hand, a course can recruit single individuals or a whole team from an organization, on the other, the principle of dissemination may be either direct or indirect. This means an intervention either with the intention of developing individuals or teams as such, or aiming at further implementation within the rest of the organization as well by indirect means. The latter alternative is based on the idea of a two-step flow of information (Lazarsfeld, Berelson and Gaudet, 1968). In the present project, the intervention carried out can be seen as a temporary network designed primarily to assist individual change by transmitting knowledge and sharing experience and expertise. (For a more detailed description of the program, see Chapter 8.)

Previous research (Fullan, Miles and Taylor, 1980; Hultman, 1983, among others) has shown that courses aimed at the individual can help develop the individual's attitudes and skills, but it also shows that this kind of training probably has little positive effect on the organization. With respect to the present study dealing with the information situations of small and medium-sized companies, it can be hypothesised that managers of these kinds of enterprises fill such an important key function for organizational life (including the gatekeeper function) that the possibilities of effects on the organization probably increase. However, because the training was focused on the individual and not directly on the organisation, it is likely that while certain effects on the individual's attitudes and skills might be expected, the effects on the organization would be smaller.

The Case Study Approach

Simultaneously with the growth of a qualitative research paradigm (see, Qualitative and Quantitative Research), researchers within the field of education have shown growing interest in methods used in disciplines such as anthropology and ethnology. Even important advocates of empirical behavioural sciences like Campbell (1974) and Cronbach (1975) have been emphatic as to the importance and usefulness of ethnographic methods compared with conventional positivistic methods. These interdisciplinary influences are said to have

contributed to the development of an ethnographic and naturalistic field of research in education (Berglund, 1983). The case study approach has aroused considerable interest in this connection.

According to Yin (1981), the distinguishing characteristic of the case study as a research strategy is its attempts to examine:

> (a) a contemporary phenomenon in its real-life context, especially when (b) the boundaries between phenomenon and context are not clearly evident (ibid., p. 59).

The case study researcher typically observes the characteristics of an individual observational unit (Werdelin, 1982; Cohen and Manion, 1994; Yin, 1993, 1994). The case need not be a person. Stake (1978) points to the fact that it can be any bounded system of interest, an institution, a program, a collection or something else. Irrespective of who or what constitutes the single case or small number of cases, the case is used as the observational taxonomic unit (OTU) and the unit of analysis (Werdelin, 1982; Ellström, 1984).

The choice of a case study approach for the present study of information barriers was based on the advantages of this strategy tin terms of satisfying the intention of describing the reality being studied with an in-depth focus on the individual from a context-bound holistic perspective.

In these circumstances, case studies comprise an action-related data collection strategy, focusing on an individual or a group of some kind close together, which studies a phenomenon from the point of view of the observed person or group. Consequently, case studies become part of the action research approach used in the present study. The method facilitates the collection of data on factors that influence an individual and on causes and effects not obtainable through other methods. Werdelin (1982) states that the method is also theoretically important because a theory of cause and effect as regards human behaviour has to be built on knowledge of individuals. Werdelin expresses his view as follows:

> From a practical point of view this is important, since education deals with individuals and shall take care of individuals. From a theoretical point of view it is also essential, since a sound theory covering reasons for and effects of human behavior must be based on data found for individuals; only in this way can insight be gained about reasons for human behavior (p. 319).

The case study method is emphasized as being the most valuable also in the literature in the field of information science (de Grolier, 1975; Thunberg, 1982; Wilson, 1980).

Most often, a combination of various data collection instruments is used in a case study, for example, in-depth interviews, questionnaires and various written materials, depending on the problems and objectives of the study. Case studies indicate a search for as much data as is feasible on the individual or group studied in order to reach optimal understanding (Werdelin, 1982). Consequently,

case studies can include both quantitative and qualitative analyses (Stake, 1978; Yin, 1981), but even if the testing of hypotheses is important, it is always subordinate to the understanding of the case (Stake, 1978). Typically, this type of investigation emphasizes qualitative analyses. Examples of a study combining both kinds of analyses are the organizational case study of Gross, Ginquinta and Bernstein (1971), and the present study. There are also examples of studies relying solely on quantitative analyses.

In information utilization research, case studies are often referred to as routine activities without researchers being aware of the possibilities offered by the method. Data are handled in the same manner as in traditional research, in a generalizing perspective with mean scores of the results. The fact that one has not observed these circumstances means that the explanatory possibilities of the method have not been fully utilized. Havelock (1973) argues that there are too few case studies within the research on information dissemination and utilization and that it is very unsatisfactory to find so few documented in such a way that others can profit from them.

Chapter 4

Generating and Analysing Data

The purpose of this chapter is to present the methods used in the study.

First, the design and the choice of methods will be described, followed by a description of the group studied and an analysis of the drop-out of the sample during the course of the study. Then, an account will be given of the execution of the study, and the variables included, as well as a description of data treatment and display modes used. Finally, an overview of the interview techniques used, particularly the notion of in-depth interviews, will be given.

Choice of Method

The nature of the research problem and the theoretical framework within which it is placed suggest an appropriate approach for study. The choice of research method to be discussed in this section comprises two essential aspects:

- the selection of research paradigm, and
- the choice of method within the selected paradigm.

Both aspects depend on my own interpretations of the research enterprise and on lines of actions taken toward the empirical world.

The points of departure for the choice of method in the present study were the stated purposes of exploring the problems of information barriers (see Chapter 1, Determining the Objectives of the Study) and the proposed theoretical framework (see Chapter 2) and methodological considerations taken (see Chapter 3).

Selection of Research Paradigm

As stated above the theoretical framework implied the necessity of not accepting the traditional generalizing ideal of research but to use a qualitative approach according to the perspective of symbolic sciences.

First of all, this methodological statement was based on earlier research showing the limitations of purely quantitative approaches to research in this area. Its unexplored or exploratory character means that my concern is the uncovering of facts by means of qualitative research to reach a better understanding of the information user and be better able to create a useful theory of information utilization, either as a preliminary to future quantitative research (Cronbach, 1990) or as an alternative to quantitative studies which have dominated the field of Information Science in the past (Wilson, 1980).

The purpose of providing empirically grounded knowledge of the information barrier problems by uncovering the facts from the user's point of view means that the focus is placed on the subjectively constructed reality as perceived and experienced by the user. Thus, in this study, a distinction is made between descriptions of the world as such and descriptions of the world as conceived. According to Marton (1981), this represents two different levels of description, the first-order perspective and the second-order perspective. The former perspective aims at an understanding of the external, objective, and physically described reality, the latter at an understanding of the ways in which people interpret significant aspects of their own reality. The descriptive level aimed at in this study is consequently a second-order perspective with the intention of describing the world as people experience it and the conceptions they form of problems. (Compare with the stated purposes presented in Chapter 1, Determining the Objectives of the Study.)

The proposed perspective with an emphasis on interpretative analysis and understanding of real information settings, which means the subjectively constructed reality including general equalities as well as individual differences, made the traditional research paradigm less appropriate.

To meet these requirements and to be able to solve the research problems, it was decided to employ an action-research approach belonging to the alternative or qualitative research tradition (Compare with what was said in Chapter 3). This approach is meant to make it possible to reach an understanding of the problems of information barriers. Above all, this design makes it possible to use experience obtained during the process itself to solve the research problem as successfully as possible and this was found to be of decisive importance.

The action-related approach involved successive and systematic development of the design based on what happened during the research activities; experience obtained during the work process was used as a basis for further direction of the work. Consequently, from the beginning of the research activities, only a preliminary design existed which was subsequently adapted to the situation throughout the project. (A summary of the principal units and activities within the project is given in Chapter 4, Conducting the Empirical Study, Table 3.) This means that an optimal solution to the research problem was sought through successive approximation. (The methodological characteristics of action-related research and, specifically, of action-research and case-study technique were described in Chapter 3.)

Some Arguments for the Method Chosen

In order to explain the problems of my research, with its focus on the individual information user, I have preferred to perform intrinsic studies, so-called case studies. Consequently, in the present study, the case study technique refers to a data collection technique subordinate to the action research approach.

It was expected that a case study approach would enable a solution to the actual research problem to be found so that the real nature of the distinguishing

characteristics of its dimensions could be uncovered. The advantages of this method have been proven in situations where the main interest has been to develop an analytical description of human behaviour in life-like settings. Particularly, its possibilities of in-depth focus on the individual was a decisive point in its favour. (The Case study approach and its advantages were presented more thoroughly in Chapter 3.)

The methods of data collection used in compiling the case studies were in-depth interviews during the problem-exploration phase of the work, the initial diagnosis of perceived information barriers, and interviews to evaluate the two processes of intervention, the elementary program and the intensified program, respectively. Both kinds of interview techniques will be described in detail later on. (See, Methods of Data Collection.)

In line with the description level aimed at in the present study which, as stated above, is a second-order perspective in the terminology of Marton (1981), with the intention of describing the world as people experience it, the variables were mainly measured by participant ratings, which were supplemented with documentary information and observations made by the researcher.

To develop more reliable findings, the strategy of triangulation was deliberately applied, for which reason different methods of data collection were used simultaneously or in succession in order to counterbalance the possible flaws in each method. (See also Whyte, 1969; Waters, Salipante and Notz, 1978; Jick, 1979; Beyer and Trice, 1982; Silverman, 1994.) According to Denzin (1978, p 291), triangulation is defined as "the combination of methodologies in the study of the same phenomenon". Recent literature claims that there is a need to integrate different data collection methods (see e.g. Cohen and Manion, 1994). In the literature quoted, it is generally stressed that triangulation has obvious strengths and encourages productive research.

The case studies used a combination of qualitative and quantitative evidence. Thus, it can be noted that the present study links qualitative and quantitative data as complementary to each other; the non-positivist point of departure governing the research problem by no means precludes the use of quantitative techniques of data collection and analysis (See also Chapter 3, Qualitative and Quantitative Research, as well as Chapter 4, Variables and Data Analysis).

Individuals Studied

The group studied in this project consists of an available sample of twenty-three representatives of small and medium-sized manufacturing companies from two trades, namely wood industries and mechanical engineering industries. Geographically, the study has been restricted to the county of Östergötland. The criterion for the selection of these two trades was their outstanding importance to industrial life within the region. The choice was made after consultation with experts at the Östergötland Regional Development Fund. The persons included are the managers of the firms or other persons with responsibility for collecting

external information of importance to the firms so as to be in touch with developments; in a few cases the managers preferred some other person to take his place, depending on who was responsible for the search for external information in the companies. To obtain as representative a group as possible, the companies were chosen on the basis of their size in terms of numbers of employees and geographical location. It was decided to choose companies of different sizes with between 5 and 199 employees and located both close to and far away from the county seat, Linköping, where the county administration is located as well as a university, county library, development fund and other important services. The starting-point for the choice of companies was the list of small and medium-sized industries in Östergötland available at The Regional Development Fund at Linköping.

The individuals studied were divided into two separate groups, Group I and Group II, with twelve and eleven members, respectively. Throughout the description of the results, these individuals are referred to as the cases A through X.

Table 1. Description of the Groups studied with the Cases included and their Trade Affiliation.

Unit of analysis	Trade	No. of subjects	Case
Group 1	Wood	4	A, B, C, D
	Mechanical	8	E, F, G, H, I, J, K, L
Group 2	Wood	4	M, N, O, T
	Mechanical	7	P, Q, R, S, U, V, X

Statistical random sampling was out of the question because of the large number of existing industries in the region compared with the small number of cases to be studied. Furthermore, research literature on information transfer to small companies emphasizes the tremendous difficulties involved in obtaining representative statistical samples for generalizing studies of this target group. (See, for example, Capital Planning Information, 1982.) The heterogeneity of small industries is a particularly important contributory cause. Most attempts in the past have failed in this respect with serious effects on the possibility of making extrapolations to a wider context or a population; deductions about a national scene in general have been precluded by the sampling method. Furthermore, it is a well-known fact that generalizing studies within the field of Information Science have yielded very low response rates, often as low as 15–20 percent. It can then be concluded that a small-scale case study approach, based on in-depth interviews and other techniques, might be a better alternative in this investigation.

Analysis of Drop-Outs from the Study

As described in the previous section, the total group studied in this project included twenty-three persons. During the course of the study, however, changes in this group of subjects arose due to drop-outs. This section aims at making an analysis of these changes.

At the start of the study, the initial diagnosis of barriers to information utilization, all twenty-three individuals participated in the diagnostic interviews. No individual studied thus refused to take part.

The drop-outs occurred later during the course of the project, either at the time of Intervention I, the elementary program, or at the time of Intervention II, the intensified program. Table 2 shows which participants took part in the different phases of the study.

Table 2. Participants and Non-participants in the Two Interventions.

Unit of analysis		Trade	Phase	
			Intervention I	Intervention II
Group 1	Participants	Wood	A, B, C, D	A, B, D
		Mechanical	E, F, G, H, I, J	F, G, H, J
	Non-participants	Wood		C
		Mechanical	K, L	E, I
Group 2	Participants	Wood	M, N, O	
		Mechanical	P, Q, R, S	Q
	Non-participants	Wood	T	M, N, O
		Mechanical	U, V, X	P, R, S

From Table 2 it can be seen that there was a decrease from twenty-three persons at the initial phase, the diagnosis, to only eight participants at the time of Intervention II.

The stated reasons for dropping-out were of two kinds: no manifested need, and situational factors in the companies making it impossible to attend the program in question despite a stated urgent need and announced participation. Of these two causes, the latter dominated. Of those managers attending neither of the programs, the persons U and V declared early on during the diagnostic interviews that there was no need for such information and training activities. The rest had announced their willingness to attend, but at the time of the intervention they were prevented from participating because of problems within their enterprises needing urgent attention. (Compare with the results of the diagnostic interviews, chapters 5, 6 and 7.)

As regards drop-out from the second intervention program, the individuals N and P declared that the elementary program had satisfied their needs. All the remaining persons felt a strong need for an intensified program. Environmental or situational circumstances involving their companies interfered, however, forcing them to give priority to solving of these problems. (Compare with Chapter 9, Evaluation of Intervention I.)

From this analysis it is evident that the very same situational conditions which, in the description of antecentent variables were said to be crucial to the managers' possibilities to utilize information, were now said to be crucial to their possibilities of attending the intervention program; their work situation was still an important determinant with problems calling for urgent attention. (Compare with the chapters 5, 6 and 7, above all, the description of barriers with respect to external resources at the three levels of analysis.)

Conducting the Empirical Study

The present project took place from 1982 to 1999. If one looks at the research process, it is possible to distinguish different phases or units of work which are interlinked so that a decision made in one unit has consequences for the following ones. In order to provide an overview of the activities and studies within the project, a summary of the principal units is presented in Table 3 below.

From Table 3, it can be concluded that some main stages can be distinguished in this project.

First, the initial planning stage in 1982 involving the study of previous research reports, the carrying out of a pilot study to form a general basis for the project and to develop ideas and methods, and the consulting of experts in the field to obtain guidance for further work.

Secondly, the phase of problem exploration or diagnosis of the problem situation before the intervention, when the preconditions for the developmental work were identified and contacts with the potential participants were established. In-depth interviews were held in the two groups under study with a time interval of six months, in spring, 1983 and autumn, 1983. The second phase ended with the decision to bring a process of development and change into the work in order to try to minimize essential barriers to information utilization. Consequently, the decision for the intervention was not taken in advance; it was a direct effect of the results of the diagnostic interviews.

Thirdly, the planning, implementation and evaluation of the developmental work which started in August, 1983, and ended in the autumn of 1984 including two processes, namely, a general elementary programme (Intervention I) and an intensified programme (Intervention II). The elementary program was evaluated in February and May, 1984 and the intensified one in November, 1984 and April, 1985.

Table 3. Summary of Different Phases and Principal Activities during the Project

Time	Phase	Activities
1982	Project planning. Pilot study.	Planning. Studies of the literature and collection of other available data. Consulting with experts in the field. Pilot study. Development of ideas and methods. Preliminary choice of design.
Spring, 1983 (Group 1) Autumn, 1983 (Group 2)	Problem exploration (diagnosis)	Diagnosis involving in-depth interviews focusing on barriers to information utilization. Identification of preconditions for the developmental work.
Summer, 1983	Data treatment and analysis: basis for further work.	Preliminary treatment and analysis of data from the diagnostic interviews as a basis for further work in the project. Decision concerning educa tional intervention.
August - September, 1983	Implementation of the plan of action determined during the previous phase.	Discussions and contacts with potential participants. Contacts with teachers, librarians, researchers and other resource persons. Planning and development of the intervention programme
October, 1983 (Group 1) May 1984 (Group 2)	The first phase of the developmental work: educational intervention I.	Carrying out of the first phase of the educational intervention, the information programme, arranged at Linköping University: general resources and services.
February, 1984 (Group 1) September, 1984 (Group 2)	Evaluation. Diagnosis as basis for further work.	Evaluation of intervention I, the first phase of the developmental work through interviews. Decision about a second phase of intervention.
May, 1984 (Group 1) December, 1984 (Group 2)	The second phase of the developmental work: educational in-Intervention II.	Carrying out of the second phase of the intervention programme at Linköping University Library aiming at a deeper insight into methods of information seeking and the role of the university library as a source of information.
November 1984 (Group 1) April, 1985 (Group 2)	Evaluation.	Evaluation of intervention II, the second phase of the developmental work, through interviews.
1985-	Data treatment and analysis. Reporting.	Treatment and analysis of data. Writing reports. Teaching.
October - November, 1998	Follow-up study	Interviews with six managers focusing on the development from the mid 1980's.
1998 -	Data treatment and analysis. Reporting the results.	The final phase of the study. Completing this monograph. Teaching.

The final phase comprised a follow-up study carried out in the autumn of 1998. Six small-firm managers were revisited and data were collected through interviews focusing on the development from the mid-1980's to 1998. Further, data from the entire research process were treated and analysed in order to arrive at an understanding of the information barrier problems as well as the results reported. Besides written reports like this monograph, journal articles and reports of other kinds, the last phase of the work also included disseminating the scientific results by other means. This took place during seminars for other researchers and for librarians and other practitioners within the information provision sector and future librarians. It also meant teaching students at Linköping University, where the course Knowledge Development and Information Utilization (See, Appendix 4) has been developed on the basis of the results of and experiences drawn from the present study.

To sum up, it can be seen that this study of information barriers involves two processes; on the one hand, a research process and on the other, a process of change and development.

Methods of Data Collection

The data collection during the diagnostic phase of the project consisted of in-depth interviews with the managers of the firms included in the study. Each interview lasted from two to four and a half hours and included discussions as a result of unstructured questions followed by more structured questions focusing on barriers in the managers' perceived and experienced information situations. In addition to the in-depth interview technique, telephone calls and informal discussions when the researcher visited the companies were used.

The interview situation can be described as a process or a dialogue, a discussion, between researcher and subject. The handling of the interview in such a way had two purposes. First, it was intended to create an open, friendly and permissive, open-minded, non-threatening atmosphere with opportunities for the interviewees to reflect on their own information setting and that of their companies. Secondly, it was hypothesised that this technique would promote a deep insight into and an understanding of the phenomena studied. This meant finding an optimal solution to the problem how to get close to the level of description aimed at, the interviewees' conceptions of reality. (Compare with Chapter 4, Choice of Method.) It is also worth noting that the established dialectic relationship between researcher and subjects was of vital importance to the execution of the educational intervention. (See, Chapter 4, Conducting the Empirical Study.)

Each interview started with a general discussion of the situation of the enterprise and its task, structure, size, goals and so on, and of questions asked about personal background data on the manager. Then the information situation was scrutinized to chart information needs, search behaviour and use. The interviews thus focused on different themes which are central to the research

problem. After this the interview focused on diagnosing information barriers. Through an open question, the interviewees were asked to give accounts of perceived barriers they found crucial to information utilization. These data were then supplemented with information from follow-up questions of a more detailed character as well as by other means such as the semantic differential. In this way, an understanding of the problem situation as experienced by the interviewees was reached through successive approximation. (For a thorough description of the instruments, see Appendix 1.)

This process during the dialogue, with only a few questions chosen in advance, but chosen on the basis of a dialectic relationship between researcher and subjects, are characteristics that differentiate the interview technique used from the traditional one. The difference lies mainly in the way the demands of experimental control are handled. Theman (1979, p. 13) states that experimental control in such an interview situation shifts

> from being external, placed between the subject/experimenter and the situation, towards being internal, placed in the relationship between the subject and the experimenter with reference to the actual context.

In other words, there is a shift in emphasis on the part of the experimenter from being a neutral and objective observer towards being a subjective dialogue partner. According to Theman, this shift does not indicate that scientific control is set aside, but rather points to the possibility of studying previously unreachable phenomena simultaneously at the same time as a high level of scientific control is retained.

The evaluation of the intervention programs in connection with interventions 1 and 2, was carried out by means of normal interviews with the participants from the different companies. The interviews were held in each respective company. The interviews consisted of open-ended as well as structured questions focusing on quality characteristics of the two intervention programs and upon their possible effects at the individual and organizational levels in terms of human-process variables and performance variables. (See also Chapter 4, Variables and Data Analysis.) The choice of variables was based on the goals of the intervention. (For the interview forms, see Appendix 2.)

The follow-up study started with an analysis of the extent of survival contra failure and death among the companies included in this study. After this, in-depth interviews were carried out with six small-firm managers focusing on developments from the mid-1980's to 1998. The interviews, held in October - November 1998, resulted in six ethnographic stories containing the managers' own reflections on past, present and future orientation vis á vis information technology and information utilization. (For the interview form, see Appendix 3.)

Variables and Data Analysis

As a result of the three phases of empirical work presented above (see Chapter 4, Conducting the Empirical Study, Table 3), the present study comprises three broad categories of variables: antecedents, process variables and outcome variables.

The term antecedents refers to variables measuring any condition before or concomitant with the intervention process and possibly affecting this process or its outcomes (Stake, 1967; Ellström, 1984). Three subclasses of variables are included under this broad definition of antecedents: individual level variables, organization level variables and society level variables.

Together, these three subclasses form the diagnosis of information barriers at the three levels of analysis according to the theoretical framework of this study (see Chapter 2). Based on the diagnostic interviews, they correspond to the initial conditions with respect to information barriers as perceived by the managers before their eventual participation in the intervention. According to the proposed model of analysis (see Chapter 2, Analysis Model), the antecedents at these three levels are each divided into four fields or categories. Consequently, the model used makes up a system of categories for the conceptions of the information barrier problems.

Individual level variables denote individual characteristics and other prerequisites originating from the individuals studied, such as their backgrounds, skills and knowledge, attitudes, opinions and so on. The subcategory of antecedents, called organization level variables, includes variables referring to conditions in and properties of the organizational environment of the individuals. Society level variables refer to conditions and characteristics of society that affect the individual and organizational levels.

Process variables are variables functioning as mediators between antecedents and outcomes. In this study, the intervention comprised two processes, an elementary program (Intervention I) and an intensified program (Intervention II). Besides data about the planning, development and implementation of the intervention, process variables include a subclass called program variables, referred to as characteristics of the intervention program. Included are characteristics such as the frame factors of the intervention, type of intervention and its goals as well as quality ratings.

The term outcome variables refers to the products or effects of the intervention program measured at some natural and easily identifiable end point (Hackman and Morris, 1978). According to Friedlander and Brown (1974) and Ellström (1984), a distinction is made between two subcategories of outcomes, called human-processual variables and performance variables. All outcome variables are chosen on the basis of the goals of the intervention and measured by means of evaluation interviews six months after the completion of the respective programs (evaluation I and evaluation II).

Human-processual outcome variables are the effects of an intervention on the individual level with respect to knowledge, insight and affective states such as

perceptions, beliefs or attitudes. In other words, this subcategory includes variables of internal individual development.

Performance outcome variables refer to the effects of an intervention at the individual or organizational level with respect to behavioural, technological or structural changes. Consequently, this subcategory refers to variables of external development including individual and organizational behavioural changes. This definition differs from the one given by Friedlander and Brown (1974) and Ellström (1984) since these authors refer to effects at the organizational or group level.

As said before, the case studies used both qualitative and quantitative evidence. Consequently, with respect to the treatment of data collected, this linkage of perspectives might require methods used in qualitative as well as quantitative analysis.

However, the small-scale case-study approach and the selection of subjects of this study naturally place limits on the use of methods of data analysis. Limitations ascribed to qualitative research and its usual companion, case studies, generally concern the lack of clearly formulated and agreed-upon methods for analysis of qualitative data (Miles, 1979; Yin, 1981; Miles and Huberman, 1984). The main problem is that the number of variables in such a study is usually equal to or larger than the number of available cases because the context is part of the study (Campbell, 1974; Yin, 1981; Ellström, 1984). In the case of data reduction, analysis and interpretation, this fact makes statistical analysis irrelevant.

Accordingly, the data treatment in this study was essentially restricted to an ocular examination of the findings. The basic idea behind the analysis was to search for commonalties and differences in the data that seem important to an understanding of the problem situation at hand. In line with the purpose of the study, the main interest was to explore the problems, develop an analytical description and arrive at an interpretative understanding of the conditions for the information utilization process. For descriptive purposes, aggregated values, averages, of the two groups were estimated and accounted for when necessary, but did not form a basis for further statistical calculations, or for final conclusions.

The unit of work most of all needing a clarification in this connection is the diagnosis or problem exploration phase. The in-depth interview technique used for the initial diagnosis of perceived information barriers had implications for data analysis. The mainly open and somewhat unstructured interviews (see Chapter 4, Methods of Data Collection) directed the analysis so that it became principally one of identifying categories or uncovering dimensions of the interviewees' perceptions of the information barrier problems; categories which were then further illuminated by the detailed information gathered through more quantitative supplementary queries. In this way, the present study simultaneously uncovers the underlying qualitative dimensions of the interviewees' conceptions of the problems and has access to the quantities of some of these dimensions. Nevertheless, emphasis is placed on discovery. The process of data analysis and interpretation involved a search for a distinct and definite system of

categories or model suitable for data description. This model should necessarily be well-anchored in the data obtained and make it possible to discriminate between categories qualitatively (See Larsson, 1986). (The model chosen was presented in Chapter 2.)

As concerns the evaluation of the two phases of intervention, the interviews conducted were of a structured and traditional kind aiming at measures of the outcomes related to the goals of the intervention. (See the questionnaires of the evaluation interviews, Appendix 2.)

The description of data will be made not only in a generalized descriptive way, that is, from the viewpoint of the groups studied, but also in an individualized analytical way, from the viewpoint of the individual cases included in the study. This makes it possible not only to follow general trends throughout the description of the data, but also to gain an insight into the individuals' information situations. The main reason for choosing this mode of presentation is my wish to increase the reader's possibility of perceiving the complementary content of the different cases; in other words, to focus on differences and variations between individual situations as well as on agreements and common traits. The descriptions of the cases taken together form a whole, a complex representation of the problems of information barriers, which facilitates a comprehensive understanding. This way of presentation is designed to allow unique individual patterns to appear at the same time as a more generalized view of the problem is still considered. To increase the reliability of the data description and to facilitate the reader's possibility of grasping the profound meaning of the account, quotations from the interviews are given as illustrations.

Since I wished to avoid complicating the reading of this report, however, the data will be described variable by variable and not in the form of longitudinal descriptions of the different cases. Major categories according to the brief outline of variables (Chapter 2, Variables and Data Analysis) provide the basic organizing scheme of the research report. Data are used to illustrate categories and their properties. On the other hand, the data will be presented separately for each group under study with regard to cases, participants, non-participants, trade membership and, whenever possible, clarifying tables are given. The two groups are separated up to and including the evaluation of the elementary program, Intervention I. For the evaluation of the intensified program, Intervention II, it was no longer meaningful to give descriptions of the groups separately due to the fact that only eight persons were still participants in the project, seven persons in Group 1 and only one in Group 2. (See further the introduction to Chapter 2, Evaluation of Intervention II).

Thus, in spite of the qualitative approach of this study, it was found important to use an apparently quantitative method of description. The intention was that the organized display modes used, including clarifying tables and matrices would promote communicability and interpretative understanding of the results. This is in line with the suggestion of Miles and Huberman (1984) that, in a situation without outlined conceptions of how to handle qualitative data, "spatially-compressed, organized display modes are a major avenue to improving qualitative data analysis (p. 25)".

Finally, as regards the follow-up study in 1998, the ethnographic stories based on the manager's verbally communicated thoughts and experiences since the mid-1980's will be presented one by one and finally interpreted searching for meaning, summarized into categories and further generalized in order to arrive at an understanding of the managers' situations.

Chapter 5

Individual Level Antecedents

This chapter and the two following chapters, will deal with the antecedent conditions of the intervention. Because of the person centered focus I will start my presentation at the individual level of analysis.

In this chapter, antecedent data from the diagnostic interviews will be described in terms of variables of the four fields of analysis according to the proposed model of analysis: internal resources, internal preparedness, external resources and external preparedness. The four fields of analysis will be dealt with in turn.

The Field of Internal Resources

In the text below, variables measuring individual characteristics such as sex, age and number of years of employment will be dealt with first, followed by a discussion of those characteristics which give educational background in general and more detailed facts such as knowledge of technology and engineering and knowledge of available information resources and of methodology used in information seeking.

General Individual Characteristics

Table 4 below presents the individual characteristics of sex, age and number of years of employment.

As shown in Table 4, there were twenty-two males and only one female in the whole group. This composition can be assumed partly to reflect the real situation in society, where there are few female managers of small and medium-sized companies, especially in trades like wood and mechanical manufacturing industries. The female member in the study was found in Group 2 among the participants of the developmental activities in the project and was a representative of the wood trade. In the presentation of data, the female participant is called M.

As regards information utilization, the female participant, M, mentioned difficulties due to her being woman in such a male-dominated field of work. Sometimes she felt isolated from her male colleagues in the same branch.

> There is some difficulty in my relations with colleagues and I feel isolated. The possibility of finding close discussion partners is affected - I have to exert myself. (M)

Table 4. Individual Characteristics: Sex, Age and Number of Years of Employment

Unit of analysis	Trade	No. of cases	Case	Sex	Sex is a barrier	Age	Age is a barrier	No. of years of employment
Partici-	W	4	A	Male	No	46	No	1
pants			B	Male	No	45	No	11
			C	Male	No	58	No	15
			D	Male	No	65	Yes	35
		M	6 E	Male	No	55No		1,5
			F	Male	No	30	No	11
			G	Male	No	57	No	33
			H	Male	No	25	No	5
			I	Male	No	56	No	26
			J	Male	No	28	No	2
Non-parti-	M	2	K	Male	No	60	Yes	23
cipants			L	Male	No	50	No	2
Group 1		n=12				Mean=47.8		Mean=13.7
Partici-	W	3	M	Female	Yes	50	No	30
pants			N	Male	No	40	No	7
			O	Male	No	56	No	42
	M	4	P	Male	No	42	No	2
			Q	Male	No	37	No	9
			R	Male	No	65	Yes	43
			S	Male	No	31	No	1
Non-parti-	W	1	T	Male	No	40	No	9
cipants	M	3	U	Male	No	48	No	6
			V	Male	No	41	No	1
			X	Male	No	50	No	4
Group 2		n=11				Mean=45.1		Mean=14

From the table, it is evident that none of the male managers reported that sex was important in information utilization.

Table 4 also shows the distribution by age of the members of the two groups. The age distribution, shown in the table indicates no large differences between the two groups under study, but there are considerable age differences within the groups; individual values range between 25 and 65 years in Group 1 and between 31 and 65 years in Group 2.

In the analysis of data from the diagnostic interview, three persons, all those 60 years of age or more, namely participant D and non-participant K in Group 1 and non-participant R in Group 2, found that age has a bearing on information utilization. They argued:

> When you are close to retirement age it's not worth much effort to seek new information or knowledge. (D; the same idea expressed in other wordings also by R)
>
> You can possibly manage to get along with old solutions without new investments - a process of passivity has started. (K)

Finally, Table 4 shows the distribution of number of years of employment in the two groups. The individual values within the two groups ranged from 1 year to 35 years and from 1 year to 43 years of employment, respectively, which indicates considerable individual differences in this respect.

Educational Background

Table 5 below presents individual characteristics with respect to educational background, knowledge of technology, knowledge of foreign languages and assessments of the importance of these variables in information utilization.

With respect to educational background, the interviewee data indicate considerable individual differences among the interviewees. Table 5 shows that the two groups were heterogeneous with individual values ranging from an education at the elementary or compulsory level to an education at the university level. There were more interviewees with a secondary education than with a either primary or a higher education. However, the members of Group 1 had a lower education level than those in Group 2. A comparison of data in the table on differences between the two trades, wood and mechanical industries, shows that six out of seven persons with an academic degree represented the latter. The non-participants had either a secondary or a higher education, while the participants represented all three levels of education.

Table 5 also shows that a large proportion of the interviewees, fourteen out of twenty-three, found that their educational backgrounds either limited their ability to utilize information to a certain extent or formed a serious barrier. In Group 1, the interviewees with an elementary education, F and H, as well as those with a secondary level education, C, D, E and I, were of the opinion that their educational background was some limitation, while the interviewees with an elementary education, B and G, as well as the one with a secondary level education, K, mentioned educational background as a crucial barrier obstructing their utilization of information. In Group 2, persons Q and T mentioned certain limitations, while persons with an elementary education, O and R, and M, with a secondary level education, found their information utilization seriously hampered. The conclusion is obviously that there is a high correlation between educational background and perceived ability to use information

Table 5. Individual Characteristics with respect to Level of Education, Knowledge of Technology and Knowledge of foreign Languages.

Unit of analysis	Trade	No of cases	Case	Education	Educational background limits information utilization	Knowledge of Technology	Knowledge of foreign languages			Limited knowledge of foreign languages obstructs information
							English	German	French	
Participants	W	4	A	Secondary	Not at all	Good command	Good	Limited	Lack	Not at all
			B	Elementary	Seriously	Lack	Lack	Lack	Lack	Seriously
			C	Secondary	To some extent	Good	Good	Good	Good	Not at all
			D	Secondary	To some extent	Limited	Limited	Lack	Lack	Seriously
	M	6	E	Secondary	To some extent	Good	Good	Lack	Lack	To some extent
			F	Elementary	To some Extent	Good	Limited	Lack	Lack	To some extent
			G	Elementary	Seriously	Lack	Lack	Lack	Lack	Seriously
			H	Elementary	To some extent	Limited	Limited	Lack	Lack	To some extent
			I	Secondary	To some extent	Good	Good	Limited	Limited	Not at all
			J	University	Not at all	Good	Good	Limited	Limited	Not at all
Nonparticipants	M	2	K	Secondary	Seriously	Limited	Good	Limited	Lack	To some extent
			L	University	Not at all	Good	Good	Limited	Lack	Not at all
Group I		n=12								
Participants	W	3	M	Secondary	Seriously	Lack	Good	Limited	Limited	To some extent
			N	University	Not at all	Limited	Good	Good	Good	Not at all
			O	Elementary	Seriously	Good	Lack	Lack	Lack	Seriously
	M	4	P	University	Not at all	Good	Good	Limited	Lack	Not at all
			Q	Secondary	To some extent	Limited	Limited	Lack	Lack	To some extent
			R	Elementary	Seriously	Lack	Lack	Lack	Lack	Seriously
			S	University	Not at all	Good	Good	Limited	Lack	Not at all
Nonparticipants	W	1	T	Secondary	To some extent	Good	Good	Lack	Lack	To some extent
	M	3	U	Secondary	Not at all	Good	Limited	Lack	Lack	To some extent
			V	University	Not at all	Good	Good	Lack	Lack	To some extent
			X	University	Not at all	Good	Good	Limited	Lack	Not at all

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The importance of knowledge of technology and engineering in information and knowledge utilization was measured through the interviewees' own assessments of perceived influences. Table 5 presents the assessments grouped into three categories indicating no, certain or strong influence. It is evident that most interviewees in this study were of the opinion that they had a good command of technology and engineering and could assimilate information of any kind. However, the table also indicates barriers resulting from limited command or lack of knowledge of technology and engineering.

Considering the values of Group 1, two interviewees stated that lack of knowledge of technology and engineering was a serious barrier to their ability to utilize information (the participants B and G) and three persons were of the opinion that limited command did to a certain degree constitute a hindrance (participants D and H and also non-participant K). In Group 2, there were two interviewees who reported strong effects (participants M and R) and another two persons who stated certain negative effects of limited command of technology and engineering (participants O and Q). As is clear from Table 5, there were no appreciable differences between the two groups in this respect, but individual differences existed within the groups.

These results must be treated in the light of data on educational background presented above. Most interviewees were of the opinion that their level of education was too low and that they were more or less self-educated in technology and engineering, primarily from practical experience. As can be seen in Table 5, several interviewees had experience from many years of employment, in some cases more than 40 years in the same industry and the same field of work. Some statement may illustrate this:

> Lack of knowledge in general as well as in the field of technology is in my opinion a serious limitation to my ability to utilize information. When it is a question of technology and related issues, I'm almost self-educated and I have an insufficient command. This makes it very difficult to take part in, read and assimilate technical information. (M)

> I feel a certain lack of technical knowledge, which affects my information utilization in such a way that I often have to rely on consultants - that's a shortcoming. It's a pity that my education is too limited. (K)

> Crucial to your ability to manage your information utilization are your personal qualifications with respect to education, experience, problem-solving ability and so on. (L)

> It is a handicap not to be educated in technology and engineering. Developments in this field are very rapid and it is getting more and more difficult to keep up. On the whole, my educational background is too limited, which affects my ability to utilize information as well as adequate decision-making in general. I have sometimes failed in decision-making. (G)

To obtain a picture of the interviewees' knowledge of foreign languages, they were asked to state their opinions about this kind of knowledge. From Table 5 it is evident that there were no appreciable differences between the two groups but that the individual values within the groups varied considerably from no knowledge of any foreign language to good knowledge of two or three. This indicates considerable individual differences in this regard. Somewhat more than half of the interviewees stated that they had good knowledge of English, while only two persons had good knowledge of French, German and English. As a matter of fact, these two persons (C and N) were also the only ones who had a good command of two foreign languages. Four persons (B, G, O and R) had no knowledge at all of any foreign language.

In the light of this, it is essential to consider the interviewees' perceptions of the importance of knowledge of foreign languages in information utilization. From Table 5 it is evident that more than half of the interviewees in this study were of the opinion that the fact that they had limited or no knowledge of foreign languages limited their ability to utilize information, either to some extent or seriously. The values, according to Table 5, did not indicate appreciable differences within the groups.

These findings can be illustrated by some statements:

> Lack of knowledge of foreign languages has a serious effect on my information utilization and on the company's external contacts in general. It's very bad that we, for example, have to seek advice and rely on persons outside the company to manage our commercial correspondence abroad. It's a terrible shortcoming not to have that knowledge yourself, but I haven't found the time to do anything about it ... (O)

> If I had acquired knowledge of foreign languages, my information utilization would have been more meaningful. As it is now, I cannot read and learn from reports or articles in journals which are written in a foreign language. That's a handicap, finding yourself compelled to rely on second-hand information. (G)

> I have to rely exclusively on information in Swedish because of a lack of knowledge of foreign languages, even if it is below my real information needs. (R)

Capacity of Information Seeking

To obtain a comprehensive view of the interviewees' perceptions of the personal information utilization process, the instrument known as the semantic differential was used. The logic of the semantic differential is explained by Osgood and others (1971). The instrument was developed to measure connotative meanings and to make it possible to differentiate between various concepts with respect to different individuals. The form used (Appendix 1) contained the single concept to be tested, information seeking, followed by bipolar adjectives on a scale with

seven grades. The semantic differential can thus measure dimensions of feelings (good-bad) and variations in the potency or intensity of these feelings (strong-weak). The adjectives were selected on the basis of the factor analysis reported by Osgood and co-workers (1967). With the intention of obtaining a picture of how information seeking is perceived, the interviewees were asked to state their valuation of the concept "information seeking" by filling in the special form. A high value on the scale means a positive direction, while a low one indicates a negative direction.

Table 6. Perceptions of Personal Information Utilization Measured by Means of the Semantic Differential Scale (Osgood, 1967).

Unit of analysis	Trade	Case	Feelings of information utilization			
			Active Passive	Rational Intuitive	Competent Incompetent	Successful Unsuccessful
Parti-cipants	W	A	6	7	6	6
		B	5	6	2	5
		C	7	6	4	6
		D	7	5	4	5
	M	E	6	6	4	4
		F	3	5	4	5
		G	6	3	3	5
		H	5	5	3	4
		I	7	7	4	4
		J	4	4	2	4
Non-parti-cipants	M	K	5	6	4	5
		L	5	5	3	5
Group 1	n=12	Means	5.58	5.42	3.58	4.83
Parti-cipants	W	M	5	5	4	5
		N	2	5	5	5
		O	5	4	2	4
	M	P	5	6	5	5
		Q	2	7	4	7
		R	5	6	2	5
		S	5	5	5	5
Non-par-ticipants	W	T[1)]	-	-	-	-
	M	U	6	5	5	5
		V	7	7	7	7
		X	4	5	4	5
Group 2	n=10	Means	4.6	5.5	4.3	5.3

1) Case T in Group 2 did not reply to this questionnaire

Table 6 presents the values with respect to the following feelings concerning information seeking: active versus passive, rational versus intuitive, competent versus incompetent and successful versus unsuccessful.

Table 6 shows no large inexplicable differences with respect to means between the two groups. There were no large differences between the groups, but individual differences within these. The general trend of the individual profiles showed lower values on the competent-incompetent scale in comparison with other scales, which indicates a general perception of insufficient competence and capability with respect to information seeking. It can also be noted that a few negative perceptions were found on the active-passive dimension reflecting feelings that information seeking is a passive process.

To obtain a more profound understanding of why and in what way the interviewees' capability was restricted, they were asked about their opinions on that issue. Table 7 below presents the results in terms of assessments with respect to knowledge of information resources available, knowledge of methodology of information seeking and the importance of this kind of knowledge in the information utilization process. Here, information resources means resources in general, university resources and library resources. Methodology refers to the ability to handle methods of information seeking, that is, skills in how to manage this process; to find ways of obtaining relevant information in the library or elsewhere. In other words, it is a question of skills in using different information sources appropriately and effectively to meet information needs, information literacy skills.

From Table 7 it can be concluded that most interviewees found their knowledge of available information resources strongly limited with respect to general resources as well as university and library resources, and that their information utilization was seriously affected. Only two persons (non-participants V and X, both university educated) reported good knowledge without any limitations to their information utilization. The general feature of the material was, consequently, that insufficient knowledge of existing information resources constitutes a serious barrier.

Table 7. Assessments of Knowledge of Information Resources and Knowledge of Methodology of Information Seeking and their Impact on Personal Information Utilization.

Unit of analysis	Trade	No of cases	Case	Knowledge of information resources			Limited knowledge of information resources obstructs information utilization	Knowledge of methodology of information seeking	Limited command of methods obstructs information utilization - I need training
				Resources in general	University resources	Library resources			
Participants	W	4	A	Good	Lack	Good	To some extent	Good command	Not at all
			B	Lack	Lack	Limited	Seriously	Insufficient	To a great extent
			C	Lack	Lack	Lack	Seriously	Insufficient	To a great extent
			D	Lack	Lack	Lack	Seriously	Insufficient	To a great extent
	M	6	E	Lack	Lack	Lack	Seriously	Insufficient	To a great extent
			F	Lack	Lack	Lack	Seriously	Insufficient	To a great extent
			G	Lack	Lack	Lack	Seriously	Insufficient	To a great extent
			H	Lack	Lack	Lack	Seriously	Insufficient	To a great extent
			I	Lack	Lack	Lack	Seriously	Insufficient	To a great extent
			J	Lack	Limited	Lack	Seriously	Insufficient	To a great extent
Nonparticipants	M	2	K	Lack	Lack	Limited	Seriously	Insufficient	To a great extent
			L	Lack	Good	Good	To some extent	Insufficient	To some extent
Group 1		n=12							
Participants	W	3	M	Lack	Lack	Lack	Seriously	Insufficient	To a great extent
			N	Lack	Lack	Lack	Seriously	Insufficient	To a great extent
			O	Lack	Lack	Lack	Seriously	Insufficient	To a great extent
	M	4	P	Good	Lack	Good	To some extent	Good command	Not at all
			Q	Lack	Lack	Lack	Seriously	Insufficient	To a great extent
			R	Lack	Lack	Lack	Seriously	Insufficient	To a great extent
			S	Limited	Lack	Lack	To some extent	Insufficient	To a great extent
Nonparticipants	W	1	T	Lack	Lack	Limited	To some extent	Insufficient	To a great extent
	M	3	U	Limited	Lack	Limited	To some extent	Insufficient	To some extent

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Most interviewees stated difficulties in finding "appropriate channels, information resources or ways to get contacts": The following quotations from the diagnostic interview illustrates the general opinion of the managers:

> To know where to turn - that's a problem. (G)

> I would like to know where I can find relevant information. Where to go to find information is problematic. Lacking these resources is fatal to my possibilities of satisfying my information needs. It might help a lot to get information about relevant ways to find relevant resources. (B)

As regards university resources, the general opinion of the interviewees was that their knowledge of universities and whatever service these can offer was very restricted, which affected their ability to determine whether this resource was relevant or not in meeting the needs of their company; they had only vague perceptions as a basis for making decisions. The following quotation from the diagnostic interview illustrates the general opinions of the interviewees:

> I know too little about the university and its resources to be able to decide whether it is useful in practice. What I need is information about what the university can offer. (G)

The general opinion of library resources expressed by the managers were:

> I don't know much about libraries and I have not thought of this resource in terms of meeting the information needs of the company either. (M)

A few interviewees were of the opinion that if they had known more about what libraries could offer, this might have facilitated their work. Only a few persons, L, P and V (all three university educated) knew about Linköping University Library and about the fact that they could use this resource. Their opinion was that

> many technicians don't even know that the university has a library that can be used - awareness of this resource is very low in the region. (L)

Another person, J (university educated), did know about the university library, but he thought that it was open only to university staff and students and consequently not open to external groups in society.

Table 7 further shows that most interviewees reported insufficient command of the methodology of information seeking, which to a large extent was perceived as hampering their information utilization. Some quotations from the diagnostic interviews might provide further understanding of this barrier and its consequences:

> To know what you really want to know, that's dificult; To know what to look for, how and where. (V)

> Often, you grope your way at random by means of a trial and error process - guidance as to how to proceed is needed. (C)
>
> Information is needed to get on the right track. (F)
>
> Much is done intuitively - knowing more about how you can go about seeking information more rationally is a matter of urgency. (L)
>
> Difficult to know how and where to search. Effective strategies are strongly needed. (I)

From Table 7, it can be concluded that the results not only indicate serious barriers in terms of insufficient knowledge of available resources and methodology of information seeking, but also point to the urgent need for information and training in this respect. When asked directly, all the interviewees except non-participants U and V revealed a desire to have an opportunity to attend an information program about how to meet these needs.

The Field of Internal Preparedness

In the text below, the results of the diagnostic interview will be presented in terms of variables of internal preparedness at the individual level.

First, data on individual needs and motives for information seeking and utilization will be presented together with general opinions about ways in which information seeking and utilization is perceived by the interviewees. This will be followed by a discussion of attitudes towards libraries and expectations of the role played by the latter as regards small and medium-sized companies. Finally, attitudes towards universities in general and expectations about the importance of universities to small firms will be reported. The data presented are self ratings.

Opinions about Information Seeking

To obtain a picture of how information seeking is perceived, semantic differentials were employed. (See Chapter 5, Capacity of Information Seeking for a more extensive description of the instrument.)

The interviewees were asked to give their assessment of the concept information seeking by filling in a special form during the diagnostic interviews (See, Appendix 1.) Table 8 shows each individual's answers to the semantic differential scale items.

The table shows that the profiles of the two groups are very similar. An examination of the visual profiles reveals that both groups perceived information seeking as fairly positive, valuable, essential, meaningful and interesting. On the other hand, negative answers were found, in particular as regards the laborious -

Table 8. Individual Profiles of Feelings about Information Seeking.

Unit of analysis	Trade	Case	Positive Negative	Valuable Worthless	Essential Unessential	Meaningful Meaningless	Interesting Boring	Restful Laborious	Easy Difficult	Simple Complex
Group 1 Partici-		A	6	6	6	7	6	4	2	6
pants	W	B	5	5	4	4	5	2	3	3
		C	5	5	6	7	7	3	6	6
		D	7	7	7	7	7	4	3	5
Partici-		E	7	7	7	7	6	5	4	5
pants	M	F	5	5	5	6	5	1	4	4
		G	6	6	7	6	6	3	3	5
		H	5	4	4	5	5	3	3	3
		I	3	7	7	7	7	2	3	2
		J	6	6	6	7	4	2	2	2
Nonparti-	M	K	5	6	6	7	6	4	3	5
cipants		L	6	6	5	5	5	2	3	2
Mean			5,5	5,83	5,83	6,25	5,75	2,92	3,25	4
Group 2 Partici-	W	M	5	6	6	6	5	3	4	4
pants		N	2	3	5	6	6	3	3	4
		O	5	5	5	4	5	2	4	5
Partici-	M	P	6	6	6	6	4	3	3	4
pants		Q	6	6	7	7	7	2	1	2
		R	6	7	6	7	6	2	3	4
		S	7	7	7	6	7	2	5	5
Nonparticip	W	T 1)	-	-	-	-	-	-	-	-
Nonparticip	M	U	6	6	6	6	6	2	3	3
		V	7	7	7	7	4	4	7	7
		X	6	6	6	6	6	3	5	2
Mean			5,6	5,9	6,1	6,1	5,6	2,6	3,8	4

Group 1 n=12 Group 2 n=10

1) Case T, member of group 2, did not answer this questionnaire

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restful dimension, but also to some extent with respect to difficulty and complexity. Individual values worth noticing are those given by person N in Group 2, which indicate extremely low values in the positive-negative as well as the valuable-worthless dimensions.

In conclusion, the valuations obtained by means of the semantic differential are very much in accordance with the results presented in Chapter 5, The Field of Internal Resources, particularly those covered by the subsections Educational Background and Capacity of Information Seeking.

Motives for Information Seeking and Use

To measure the motives for information seeking and utilization and the perceived information needs, the interviewees were asked to indicate their main motives. The statements were then analysed and divided into categories. It should be noted that it was possible for the interviewees to state more than one motive. Table 9 provides an overview of stated motives.

In nearly all cases, more than one motive was stated for information utilization, often belonging to related areas. The essential motives are the need to keep abreast of developments and adapt oneself or one's enterprise to changes within the environment. Changes were supposed to require development of one's own competence for the survival or development of the company. Other motives emphasize the need for competence for reliability in decision making and successful problem solving. Another motive concerns the need for contacts with other people and reflects a perceived feeling of isolation in the small company and a need for a discussion partner.

From the data, it appears that the motives stated are of two kinds: how to manage shortcomings in order to survive, and how to develop.

Perceptions of Libraries

As is shown in the presentation of data in the field of external resources (see Chapter 5, The Field of External Resources), only three of the interviewees, cases L, P and V, had ever used library resources to meet their information needs. It was therefore important to obtain a picture of personal opinions about and attitudes towards libraries and, accordingly, all the interviewees were asked to specify their personal feelings about the latter.

In this study the interviewees' general opinions of libraries consisted of predominantly somewhat vague perceptions even if more negative attitudes are also shown. The vague opinions were based on unfamiliarity with and insufficient knowledge of library resources, partly due the fact that the manager had not used this kind of information source. Positive perceptions of libraries were not very common. Only three interviewees, non-participant L in Group 1, and participant P and non-participant V in Group 2, were of the opinion that libraries are useful sources of information.

Table 9. Stated Motives for Information and Seeking and Use.

Motive	Group 1 Participants W				M						Nonpart M		12	Group 2 Participants W			M				Nonpart W		M		11	Total
	4				6						2			3			4				1		3			
	A	B	C	D	E	F	G	H	I	J	K	L		M	N	O	P	Q	R	S	T	U	V	X		
Keep abreast of the development	x	x	x	x	x	x	-	-	x	-	x	x	9	x	x	x	x	x	-	-	-	-	x	-	6	15
Develop own competence	-	-	x	x	-	x	-	x	-	x	-	-	5	x	x	-	-	-	x	-	x	x	-	-	5	10
Survival of company	x	-	-	-	-	-	-	-	x	-	x	-	3	-	-	x	-	-	x	-	x	-	x	x	5	8
Develop company; new, better products	-	x	-	-	x	-	x	-	x	-	-	-	4	-	-	-	x	-	-	x	-	-	-	x	3	7
Manage work and solve technical problems more effectively	-	-	-	-	-	-	-	x	-	x	-	-	2	-	-	-	-	-	-	-	-	x	-	-	1	3
Reliability in decision making	-	-	-	-	-	-	x	-	-	-	-	-	1	-	-	-	-	-	-	x	-	-	-	-	1	2
Get in contact with other people	-	-	-	-	-	-	-	-	-	-	x	-	1	-	-	-	-	-	-	x	-	-	-	-	1	2
Instinct for self-preservation	-	-	-	-	-	-	-	-	-	-	-	x	1	-	-	-	-	-	-	-	-	-	-	-	0	1

Group 1 n=12 Group 2 n=11 x=stated motive

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It is evident that among the more articulated negative statements, there were a few which indicated that it was difficult to find things in libraries, partly because of the way in which the collections are organized and partly because of complicated library access catalogues. There were also opinions reflecting the problem of the rapid obsolescence of printed documentation in general and, consequently, also with regard to the materials libraries cover, which affects the expectations of the usefulness of these resources. According to the data, there were opinions which indicated feelings of uncertainty and anxiety when confronted with information-seeking processes in libraries. Libraries were said to inspire a kind of intellectual resistance including anxiety about consulting librarians, for example, because of a fear of making a mistake by not asking the right questions. In other words, this indicates barriers affecting the user-library interface as well as the dialogue between the user and the library staff. These barriers were to some extent perceived as preventing the interviewees from using the library resources. Finally, there was a negative opinion reflecting the public discussions in recent years about the cultural role of libraries, especially the educational role with consequences such as weeding out books criticized on the basis of certain criteria related to the cultural intentions of society.

In addition to these negative opinions, it is worth noting that there were clear statements about libraries being particularly intended for recreation. The respondents do not think of libraries when it is a question of finding facts or obtaining professional information of any kind.

It is clear that either a combination of a vague opinion of libraries and another often negative opinion, or a combination of different more or less negative perceptions make the effects even more serious. This is especially noticeable with regard to participants A, B, C, D, H and I in Group 1 as well as to participant Q and non-participants U and V in Group 2.

Expectations of the Role of Libraries for Small Companies

To measure the expectations of the role of libraries in meeting the information needs of small industries, the interviewees were asked to state what they expected in this respect.

The analysis of the material indicates that most members of the total group studied doubted or did not believe that libraries have an essential role to play in satisfying the information needs of small industries. Thirteen interviewees were convinced that libraries are not essential, while seven persons were doubtful about the roles of the libraries. Only four interviewees (J, L, P and V) had positive expectations, implying the belief that libraries are really essential to satisfying the information needs of small companies. It is evident that, in this study, the expectations about the essential role of libraries were predominantly negative.

There were no significant differences in terms of the values of the two groups. It is also clear that the interviewees stating positive expectations of the role of

libraries were both participants and non-participants. All were exclusively representatives of mechanical industries.

To obtain a comprehensive view of the beliefs of the role of libraries held by the interviewees, the expectations reported above will be illustrated by some statements:

One dominant trait among the utterances involving negative expectations of the role of libraries for small industries was that the respondents had never thought or did not think of libraries as essential sources of information for small industries, were convinced that libraries do not have a relevant role to play in satisfying the information and knowledge needs of small companies or did not think of libraries because these were not supposed to cover material relevant or up to date to the demands of small industries. The material indicates conceptions of libraries primarily concentrated on recreation and fiction.

> I never think of libraries in this context (to satisfy the information needs of the company). (F)
>
> When I think of libraries it is connected with fiction - never in connection with my information needs as a manager. I'm thus very doubtful. (A)
>
> I don't think libraries have got what I need - the activities of small firms are so far from what libraries can offer. (N)
>
> I don't think libraries can do something revolutionary because of the difference in time between the materials in libraries in relation to reality. (S)

Two persons did not see the role played by the library because of their uncertainty about the competence of the library staff:

> I don't think libraries have adequate competence to get in touch with the information needs of small enterprises. (K)
>
> Are libraries really adequately qualified? (G)

The statements showing uncertainty about the role of libraries are to some extent due to a lack of knowledge of what libraries really cover, sometimes depending on insufficient information or lacking experience of library resources:

> I'm very very uncertain about the role of libraries, but I don't have enough information about what libraries can offer. If I had that information, it would perhaps have been easier to decide on the impossible role. (E)
>
> I have never used the library to get information of any kind and it makes me uncertain about the possible role of the libraries. (T)

The four statements of positive expectations of libraries (J, L, P, and V) were all based on the interviewees' own experience of library use:

> I think libraries can and ought to be essential sources for small industries - that's my experience. (P)

The statements showing positive expectations also included one person's opinion that university libraries or other scientific libraries can sometimes be essential, but because of his belief that he was not allowed to use the university resources since he was outside the university, he had remained a non-user:

> Libraries can be essential sources and I'm specially interested in the university library. But I didn't know it was open to me, being outside the university, and consequently I did not try to use it. (J)

This last statement points to the belief that the university resources are available exclusively to people at the university such as teachers, research staff or students.

Opinions about Universities

General perceptions about universities were measured in the same way as were opinions about libraries, namely, through the interviewees' personal statements on this issue. Regarding the values, it is evident that the categories of stated opinions reflect both positive perceptions of universities and statements including more negative connotations.

The most frequently volunteered opinion in this study was the perception of universities as too theoretical with a need for better anchoring in real life. About half of the interviewees, both in the total material and in each of the two groups, held this opinion. The following two statements indicate the presence of unfamiliarity or even alienation from this knowledge resource:

> The university inspires respect - one feels a difference in level. (D; the same idea expressed also by O, Q and R.)

> The university is a bit frightening - it ought to be more human. (X; the same idea expressed in other wordings also by B)

As regards the more positive statements, seven interviewees in the total material (A, E, I, K, L, P and V) were of the opinion that the university is an unexploited resource in society needing better marketing. Finally, five persons (G, H, M, O, and T) were of the opinion that the university seems interesting, but that their information about this resource was very restricted. These last two statements indicate the need for better marketing of and information about university resources.

Expectations of the Role of Universities for Small Firms

To measure the expectations of the managers with respect to the role of universities in meeting the information and knowledge needs of small and medium-sized companies, the interviewees were asked to specify their personal opinions about this. The different opinions were then categorized along three dimensions (positive, doubtful or negative).

The interviewees' expectations about universities satisfying information and knowledge needs of small industries were mostly positive. Sixteen persons in the total group thought that universities would be essential for satisfying the knowledge needs of small firms, while four persons (H, M, N and Q) were doubtful about and three persons (D, O and U) negative to the possible role of universities.

Among the interviewees stating positive expectations, it was the general opinion that "it's very important to start closer collaboration between universities and small firms, or to broaden and develop already existing contacts". There were also opinions indicating that "university-small industry collaboration is a quite self-evident idea, but the university has to allow competent people to go to industry", while the doubtful opinion as well as the negative expectations seemed partly to depend on insufficient information about what universities can offer and what one can get out of these resources.

> I don't believe in the role of universities - but I need to know more about what universities can offer. (D)

> I know too little about what the university can be useful for - but give me that information and I'll see ... (H)

Finally, a few opinions were expressed which showed the presence of a cultural barrier deterring interaction between small industries and university staff:

> I can see walls between us - preventing me from even attempting to communicate with the university staff. I don't think we speak the same language - probably the researchers don't understand my problems and I cannot understand their academic terminology. (M)

It can be concluded that in comparison with the expectations of the role of libraries in meeting information and knowledge needs of small firms, a much larger part of the total group expressed more positive opinions about the possible role of universities than they did about the role of libraries. This fact was valid also for the non-participants in the two groups; four non-participants out of five stated positive expectations of universities in satisfying the knowledge needs of small firms.

The Field of External Preparedness

In the text below, the results from the diagnostic interviews will be presented in terms of variables of external preparedness at the individual level of analysis. Here, the influences of norms, laws and other kind of societal regulations will be dealt with in relation to the individual's information utilization.

The Influence of Norms, Laws and Regulations on the Individual

Generally, the managers feel that the regulatory framework, including taxation, is a heavy burden which has a large impact on their perceived individual degrees of freedom. Above all, they generally feel that they are lacking the time necessary for strategic planning, including searching for information.

It was the interviewees' general opinion that in order to create a creative environmental climate with windows of opportunities, the regulatory framework should be more transparent, stable, predictable and better co-ordinated.

The Field of External Resources

Below, I will first give an account of sources of information used in meeting the information needs of the interviewees. I will then focus on opinions about the time constraints affecting information seeking and utilization. Finally, the impact of economic resources on the individual's information utilization will be discussed. The values presented in the account of external resources are based on the diagnostic interviews and are self ratings by the interviewees.

Sources of Information Used

To obtain an insight into the existing information situations and to improve our understanding of the process by which small industries acquire information or knowledge, the interviewees were asked to describe their information situations and give their main sources of information. Table 10 provides an overview of the sources of information used. The presentation below will concentrate on general trends in the material and discuss individual differences or variations between the cases.

The list of sources given indicates the importance of contacts from outside the firm for meeting the information needs of the interviewees. All interviewees in the two groups continuously used *informal external channels* to satisfy their information and knowledge needs. It is clear that, in this study, the most frequently used sources were informal external channels in the form of personal contacts with people found outside the company. The reason for this was said to be the difficulty in finding a discussion partner in a small enterprise:

> It's a question of personnel - too few employees are available. As manager of a small enterprise you have to rely on yourself to a very large extent. Often, there isn't anyone else to advise you. (A)

> I have a finely-meshed network of personal contacts; being in communication with people is very important. (F)

From the analysis, it is obvious that *informal internal sources* were not used very frequently. Only four persons stated that this kind of source was essential and that the importance to a large extent depended on their own work role and the fact that a discussion partner with adequate competence could be found within the firm:

> Because we're working in different project groups, informal discussions with my co-workers are essential. (P)

> The knowledge possessed by the firm itself within other specific fields of work is wide. (Q)

> Because I'm fairly new in this company, my co-workers' experience is important to me. (J)

Trade organizations were the second most frequent providers of information, chiefly supplying technical information and information about market matters. The organizations used were closely related to the trade in which the persons worked.

> Most technical information is obtained from trade organizations, news about new technology, about what happens at different trade fairs and also about availability of different kinds of training courses. (E)

From *the employers' association and the trade unions* the interviewees mostly obtained information about legal matters and agreements with trade unions. The interviewees who did not use these organizations as information sources stated as a reason that they were not members of the organizations but acquired the necessary information from secondary sources, mostly colleagues from other firms in the same field of work.

Banks were considered to be essential sources of financial, commercial and legal information.

> Often the bank becomes a discussion partner and an advisor to reckon with when it's a question of financial, commercial and some legal matters. The bank offers not only data on past experience but also valuable forecasts of the future. (G)

In this study, the managers to a large extent also relied on *national or international trade fairs or exhibitions* to provide them with information about new technologies, to get ideas about new products and to keep track of developments

Table 10. Distribution of Information Sources used: Individual Profiles as well as general Tendencies.

Source	Group 1 Participants W 4 A	B	C	D	M 6 E	F	G	H	I	J	Nonp M 2 K	L	12	Group 2 Participants W 3 M	N	O	M 4 P	Q	R	S	Nonpart W 1 T	M 3 U	V	X	11	Total 23
Informal external channels	+	+	+	+	+	+	+	+	+	+	+	+	12	+	+	+	+	+	+	+	+	+	+	+	11	23
Industrial organizations	+	+	+	+	+	+	+	+	+	-	+	+	11	+	+	-	+	+	+	+	+	+	+	-	9	20
Employers' association/ union	+	+	+	+	+	+	+	-	+	-	+	+	10	+	+	-	-	-	+	+	+	+	+	+	8	18
Banks	+	+	+	+	+	+	+	-	+	-	+	+	10	+	-	+	-	-	+	+	+	+	+	+	8	18
Trade fairs	+	+	+	+	+	+	+	-	+	-	+	+	10	-	-	-	+	-	+	+	+	+	+	+	7	17
Consultants	+	+	-	+	+	-	+	-	+	+	+	+	9	+	-	-	-	+	+	-	+	+	+	+	7	16
Suppliers, vendors	+	+	-	+	+	+	+	-	+	-	-	+	8	-	-	+	+	+	-	+	+	+	+	+	8	16
Accountants	+	+	+	+	+	+	-	-	-	-	-	+	7	+	-	+	-	-	+	+	+	+	+	+	8	15
Trade journals (national)	-	+	+	-	+	-	-	+	+	+	+	+	8	+	+	-	+	+	-	+	-	+	-	-	6	14
Regional Development Fund	+	-	+	+	+	+	+	-	-	-	+	+	8	-	+	-	-	-	+	-	+	+	+	-	5	13
County Administration/ municipal authority	+	-	-	+	+	-	-	-	+	-	+	+	6	+	-	+	-	-	+	-	+	+	+	+	7	13
University/research institute	+	-	+	+	+	-	+	-	+	+	+	+	9	-	-	-	+	-	-	-	+	-	-	+	3	12
Export Council	-	-	+	+	+	+	+	-	+	-	+	-	7	-	+	-	-	-	-	-	+	-	-	+	3	10
Chamber of Commerce	-	-	-	+	+	+	+	-	+	-	+	-	6	-	+	-	-	-	-	-	-	-	-	+	2	8
Informal internal channels	-	-	-	-	-	-	-	+	-	+	-	-	2	-	+	-	+	+	-	-	-	-	-	+	4	6
Secretary of commerce	-	-	-	-	+	+	+	-	-	-	-	-	3	-	+	-	-	-	-	-	-	-	-	+	2	5
International journals	-	-	-	+	-	-	-	-	-	+	-	+	3	-	-	-	+	-	-	-	-	-	-	+	2	5
Libraries	-	-	-	-	-	-	-	-	-	-	-	+	1	-	-	-	+	-	-	-	-	-	+	-	2	3

Group 1 n=12 Group 2 n= 11
+ = used
- = not used

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in society. These fairs were chosen on the basis of the specific profile of the respective companies. The aim of visiting trade fairs was generally said to be two-fold: to obtain information about developments in the industry and to market products. A representative of a furniture company in the wood field, stated:

> I usually visit the furniture fairs in Stockholm and Copenhagen where news in the furniture industry is presented. At the same time as I get information about new trends in the industry, the market, where competing firms can be found and what they are concerned with. It is the most important way of entering the market with one's own products. The fairs in Cologne and Hannover are essential for getting information about the development of new materials and new technologies. (C)

In general, it was the interviewees' opinion that trade fairs provide opportunities for familiarizing oneself with new technology, learning about trends in one's field of work, and marketing oneself and one's own products.

Consultants, another external source of importance, were said to be essential when one's own competence is inadequate and in situations when one needs to look at different problems in the enterprise from a different perspective. Several interviewees stated that the consultant is the missing discussion partner in a small firm. In other words, at the same time as knowledge is being obtained, it is a way of easing a perceived feeling of isolation.

Other sources considered essential were *suppliers and vendors*. in Sweden or abroad.

> Most information is obtained from suppliers in Sweden and also abroad who inform about and offer training on how to use their equipment. (I)

The general opinion was also that one combines theoretical knowledge from documents with information from suppliers and vendors to be able to solve certain problems successfully.

Accountants were mentioned as another kind of source to rely on in order to satisfy existing information needs with respect to financial and commercial matters. The general opinion of the interviewees was that accountants could contribute valuable overviews based on experience, but that they were seldom adequately qualified to give a forecast of the future.

> My accountants supply me with valuable experience and also with necessary ways of looking at the situation, but seldom or never with a forecast of what the future will bring. (E)

National trade journals were frequently read by some managers. These journals enabled them to keep track of the developments in their own industry and in general to be kept informed about new ideas which sooner or later could be implemented in production.

The Regional Development Fund was primarily perceived as being a money-lending agency, but to some extent also a supplier of current information and a technical, financial and commercial counsellor.

The County Administration and the Municipal Authority were consulted mainly providing information about rates and taxes but also about different legal matters.

Universities or other research institutes were consulted by about half the total group, a large proportion. Table 10 indicates a difference between the two groups with respect to the amount of university use.

In the case of *The Export Council, The Chamber of Commerce* and *The Secretary of Commerce*, the interviewees stated that the use or non-use of these resources depended on the profile of the companies, in particular whether they were export industries or not. As a result of the profiles of the companies included in this study, a higher degree of utilization of these resources was found in Group 1 than in Group 2.

International journals were not frequently used either, sometimes depending on insufficient foreign language skills. (Compare with Subsection The field of internal resources.)

> I usually read only Swedish trade journals; my knowledge of foreign languages is not very good. (O)

Libraries of any kind were the source least of all used, according to this study, and were consequently at the bottom of the ranking list.

From the analysis above, it becomes obvious that frequent use was made of some sources while others were almost completely ignored. Besides these differences between the sources, the study showed considerable differences between the participants. These variations or differences in information-seeking behaviour can be said to result in more or less broad profiles of information utilization.

To obtain data on the role of different forms of sources of information, the interviewees were asked about their use of formal versus informal sources of information; in other words, the extent to which they utilized formal printed sources, referred to as the use of formal documented information in journals, books and so on, in contrast to informal personal contacts with people.

The data indicates the extreme importance of informal sources of information in meeting the information needs of the managers studied. In Group 1, however, there were some exceptions to this main trend. Three persons, D, G and J, stated that formal printed sources predominated and person I found no difference between the use of formal printed sources and informal personal sources.

Some statements may serve to illustrate the data presented above and also indicate why informal sources of information are so essential when it comes to

meeting the information needs of the representatives of small and medium-sized companies in this study.
First, it seems to be a question of habits or personal styles in information seeking and reading:

> I seldom pick up things by reading - I want to look at, practically touch, things, be made to feel and practically experience different problems and above all listen to and talk with people. (Q)

> I can't say I'm a 'book lover' - I seldom read to get the knowledge I need. (A)

It was also found that the majority of the interviewees thought that information or knowledge obtained through personal discussions is easier to assimilate and usually gives more prompt answers to questions.

> Verbal informal contacts are in the majority - one needs quick answers - and one can easily set about using this kind of information in practice. I usually phone until I find the right person and get the answer. (C)

> It's more efficient to consult people about the basic problems. (M)

Furthermore, the interviewees maintained that the problems to be solved in the companies are often well-known problems needing well-known solutions.

> Many sub-components of different problems have already been solved by other people. It's a question of putting the pieces together and not so much of finding new solutions. (S)

From the presentation of information sources used in this subsection it can be concluded that the results of this study are very much in line with other studies reported in the literature (see, e.g. Allen et al 1983).

Time

The interviewees were asked to estimate how much time was devoted to activities involving information seeking and utilization and also to state whether this time was sufficient compared with their perceived requirements or needs. The managers were also asked to give their opinions about the importance of the variable time to information utilization.

The results indicate important individual differences with respect to the amount of time/week devoted to information utilization, individual values ranging from 1 to 6 hours in Group 1 and from 1 to 5 hours in Group 2. It can also be concluded that even if the results indicated individual differences, the time devoted to information utilization activities seems to be only a small part of the total working time and that it was predominantly perceived as insufficient to meet existing information and knowledge needs.

The question then is: Why do the managers not devote more time to information utilization, especially when the time devoted to such activities is perceived as insufficient to meet their needs? Data from the diagnostic interview indicated that the time spent on information activities was perceived as crucial to individual processes of information utilization. In most cases, time is perceived to be a very critical factor with serious negative influences on the individual's ability to seek and use information and knowledge.

The general opinion among the interviewees was that the time factor to a large extent determines what can be done and what one can afford with respect to information utilization. Lack of time was said to be the main reason for insufficient time being devoted to information activities.

> It limits or minimizes the space within which one is free to act - It determines what you can do or afford. (I)

> I have my head full of interesting things to bring up, but when time is lacking it is impossible to do anything about it. (A)

The perceived lack of time affecting the individual's information utilization was generally thought to depend on internal or external conditions or circumstances as well as on the special role and the personal work situation of managers of a small or medium-sized companies.

> As a manager you want to minimize expenses, and therefore you have to take greater part in different tasks, work harder and, as a result, have to handle too many details at the same time. You are always disturbed by the work and planning becomes very difficult. You get a feeling of insufficiency. When time is lacking, you often have to prioritize activities of a more urgent nature. (K; the same idea expressed in other wordings also by C and T)

> You have to use your limited time effectively. It's always necessary to make priorities, and often there are things which are more urgent than information seeking. (I; the same idea expressed in other wordings also by S)

> There is not time for more - as the manager of a small enterprise I have to handle a lot of tasks and problems at the same time by myself. (E)

Some opinions expressed in the material, however, focused on possible effects of poor personal planning.

> Difficult to find time, but perhaps one doesn't use the limited amount of time available very effectively. - It's a question of personal planning. (G; the same idea expressed in other wordings also by A, J and R).

To summarize, the account above, the results indicate that the time factor is an important determinant of information utilization. Lack of time was found to have serious negative effects on the perceived ability to utilize information.

Economic Resources

Data about the ways in which the interviewees perceived the importance of economic resources to spend on information utilization at the individual level are available from the diagnostic interviews.

Most participants in this study found limited economic resources to be a crucial barrier in that they have strong limitations on or to a certain extent limit the individual's opportunities to use information. Only five persons in the total group reported no limitations to their information utilization, namely F, H, N, P and Q.

The predominant opinion about limited economic resources being a serious barrier to information utilization was that people felt that their companies were in poor financial shape. This results in a situation of uncertainty affecting the managers' perceived possibilities and desires for development in general and with respect to finding and using information: a situation where possibilities seem to be concealed or hidden by barriers.

> You can't see possibilities because you are so preoccupied with thinking about the serious financial position of the company. This creates a situation where your only desire is survival and all plans for development are put aside - your wish to find information is affected too. (G)

> You have to keep yourself within the narrow restraints determined by economic resources, fully appreciating your own limitations. (I)

> The situation is such that I have to avoid every unnecessary expense to make both ends meet, and consequently I have to prioritize. If finding the information I need involves expenditure, I cannot afford it and I have to find another solution. (O)

Generally, the interviewees were of the opinion that the fact that they always want to keep costs down causes them to increase their personal contribution in the work that affects the perceived possibilities of reserving time for information seeking.

The persons reporting no limitations on their information utilization caused by economic resources gave as their reason that

> the companies are in such good a situation that you don't need to think about frames for an issue like information seeking and utilization - you can afford the information you need. (P)

Chapter 6

Organization Level Antecedents

In this chapter, data from the diagnostic interviews have been analysed and described in terms of variables at the organizational level according to the model used in the analysis.

The Field of Internal Resources

The results of the diagnostic interviews presented in this subsection include an account of the internal personnel capacity of the companies studied.

Personnel Resources

This subsection gives an account of the collective internal competence and personal resources studied in comparison to perceived need in the light of an overview of the sizes of the companies. The values presented are self ratings obtained during the diagnostic interviews.

The interviewees were asked about their opinions about the availability of personnel and competence in comparison to perceived need. Table 11 shows the distribution of the firms by size (in terms of number of employees) as well as an account of the assessments of the availability of personnel and competence related to perceived needs.

From Table 11 it can be seen that the sizes of the firms studied are within the range of only a few (five) employees to almost two hundred, approaching the upper limit of the definition of small and medium-sized companies. However, the majority of the firms do not have more than fifty employees; half the firms do not have more than thirty employees. Most of the firms are thus comparatively small. The two companies with more than 170 employees are both in Group 2.

Table 11 further indicates that in most firms neither the number of employees, nor the competence available was perceived as sufficient to satisfy the needs of the enterprises. All the interviewees felt that the perceived lack of personnel was reflected in organizational inflexibility with serious effects on organizational as well as individual action.

Table 11. Distribution of Firms by Size and Assessments of the Number of Staff and available Competence in Comparison to perceived Needs.

Unit of Analysis	Trade	No. of state-ments	Case	No. of employ-ees	No. of persons in comparison to needs		Available competence in the company	
					Sufficient	Insufficient	Sufficient	Insufficient
Partici-pants	W	4	A	16		x		x
			B	10		x		x
			C	150		x		x
			D	25		x		x
	M	6	E	14		x		x
			F	27	x		x	
			G	50		x		x
			H	26		x		x
			I	115	x		x	
			J	115	x		x	
Non-par-ticipants	W	2	K	5		x		x
			L	48	x		x	
Group 1		n=12			4	8	4	8
Partici-cipants	W	3	M	45		x	x	
			N	180	x		x	
			O	16		x		x
	M	4	P	50	x		x	
			Q	37	x		x	
			R	18		x		x
			S	15		x		x
Non-par-ticipants	W	1	T	26		x		x
	M	3	U	25	x			x
			V	10	x		x	
			X	170		x		x
Group 2		n=11			5	6	5	6
Total		n=23			9	14	9	14

Despite their awareness of these shortcomings, the interviewees generally found it extremely difficult to solve this problem, mainly for politico-economical reasons, as illustrated in the following statement:

> You really are in a quandary - on the one hand you cannot take people into your employ for economical, political, legislative reasons and so on, on the other hand you cannot play all your cards either (A; the same idea expressed in other wordings also by E and K).

A general lack of available appropriately qualified labour in society was said to be crucial to the ability of the companies to find employees (G, K, U, X). In

addition, people were said to "prefer being employed by large companies rather than small ones". It was hypothesised that large firms are more successful in meeting people's need of personal development, promotion, security and so on. (Compare, Chapter 7, Competency in Society.)

The Field of Internal Preparedness

The data below presented are from the diagnostic interviews. First, data on the aspiration level of the firms will be presented in terms of organizational goals after which perceived information and knowledge needs will be shown.

Organizational Goals

In the literature on organizational behaviour, it has been suggested that the aspiration level of an organization is usually manifested in its goals or objectives (Blau, 1955; Cyert and March, 1963, and others). It can then be hypothesized that this aspiration level is an important determinant of organizational information-search activities. Accordingly, the interviewees in this study were asked an open question about perceived organizational goals. This information was supplemented with assessments of perceived possibilities of goal accomplishment and of the importance to information utilization. The perceptions of organizational goals are presented in Table 12.

In line with the classification of Cyert and March (1963), the goals of the companies in this study can be summarized in five broad categories, namely, production goals, sales goals, inventory goals and profit goals. The aspiration levels found in this study were of two kinds, an aspiration level of growth or development and a level of balance or just survival.

The general trend of the material was an aspiration level characterized by a higher production level, higher level of sales, effectivized marketing and a higher inventory aspiration level. But only half the companies had aspirations or plans for organizational growth, while the other half wanted to just survive. From Table 12 it can be seen that most companies in the wood field represented the lower level of aspiration. The values for the two groups were very similar, but with individual variations within the groups.

The interviewees' assessments of their possibilities of reaching their goals and their importance to information utilization point to shortcomings in the fulfilment of the perceived and articulated goals of the companies studied. Most interviewees in both groups found a contradiction between short and long-term goals in that their ability to plan in the long term was limited which also had consequences for their information utilization. Some statements during the diagnostic interviews will shed some light on this barrier:

The general opinion of the participants reflects the limited scope available for organizational action.

> To a large extent you are very busy solving urgent problems. You can never sit down and plan for the future. Dealing with current business and serving our customers must come first, everything else is left out of consideration. (C)

> It's very difficult to get the time to plan for the future. Urgent problems have to be solved. You have to produce the right amount and fill the orders, that's the be-all and end-all. Production has to be dealt with first, otherwise nothing else will work. A lot ought to be done, but the time factor makes it impossible. (D)

There were comments pointing to the characteristics of managerial work in a small enterprise involving many different roles to be played by a single person.

> There is really a conflict situation in a small enterprise. You are not even prepared for tomorrow because of all the urgent matters. In a small company all the current problems are the responsibility of one person, the entrepreneur himself - this makes you very vulnerable. (P)

> In this conflict situation you have to be both an active problem solver and a visionary. You simply must put things aside to be able to work for the future and with alternative ideas for the future. But simultaneously you must, as in a hospital, have an emergency ward for immediate action. (S)

The contradiction between short and long-term goals was also found to originate from too short-term orders.

> The fact that there is a backlog of orders for only a few months makes long-term planning very difficult. (A)

> The short-term nature of orders makes long-term planning even worse (C; the same idea expressed in other wordings also by E, O, R and S)

Finally, there were remarks focusing on shortcomings in organizational decision making.

> There is often a rigid way of looking at things in small companies. The problem causes short-term planning and diffuse, unarticulated goals which affect organizational effectiveness (F; the same idea expressed in other wordings also by I, L and X).

In summarizing the findings in this subsection, I find that the aspiration level in terms of organizational goals is an important determinant of organizational information utilization. The analysis indicates that goals are also an attention-focusing mechanism for organizational information-search activities; changes and priorities within the organizational goal structure as well as difficulties in reaching goals have negative influences on the information utilization process.

Table 12. Perceptions of Organizational Goals.

Goal Category	Opinion	Group 1 Participants A	B	C	D	E	F	G	H	I	J	Nonpart K	L		Group 2 Participants M	N	O	P	Q	R	S	Nonpart T	U	V	X		Total
Production	Intensified attempts at product development and increased production level	+	-	+	+	+	+	+	+	+	+	-	+	10	-	-	-	+	+	+	+	+	+	+	+	8	18
	Modernization and effectivization of production processes	-	-	-	-	-	+	+	+	-	-	-	+	4	+	+	+	-	-	+	-	+	-	-	-	5	9
	Afraid of large investment because of insecurity - too risky	-	+	+	-	-	-	-	-	-	-	+	-	3	-	-	+	-	-	-	-	-	-	-	+	2	5
Sales	Increased level of sales	+	-	-	+	+	+	+	+	+	-	+	+	9	+	+	-	+	+	+	+	+	+	+	-	9	18
	Prevent from decrease of sales	-	+	+	-	-	-	-	-	-	-	-	-	2	-	-	+	-	-	-	-	-	-	-	+	2	4
Market share	Increased export	-	-	-	-	-	-	+	-	-	-	+	-	2	-	-	-	+	-	-	+	+	-	-	-	3	5
	Effectivisized marketing. Finding new market shares	+	+	-	+	+	-	-	+	+	+	-	+	8	+	+	-	+	+	+	+	-	-	+	+	8	16
	Compensate for a diminishing market	-	-	+	-	-	-	-	-	-	-	-	-	1	-	-	+	-	-	-	-	+	-	-	-	2	3
Inventory	Better steering of production and inventory	+	-	+	-	+	-	+	-	+	-	+	-	6	+	+	+	-	-	-	-	-	+	-	-	4	10
	Computerize	-	-	+	-	+	-	+	-	+	-	-	-	4	-	+	-	-	-	-	-	-	-	-	-	1	5
	New localities	-	-	-	-	+	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	+	-	-	-	-	1	2
Profit	Growth: increased profit	-	-	-	+	+	+	+	+	+	-	-	+	7	-	-	-	+	+	-	+	+	+	-	-	5	12
	Survival: increased profit	+	+	+	-	-	-	-	-	-	+	+	-	5	+	+	+	-	-	+	-	-	-	+	+	6	11

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Information and Knowledge Needs

Some essential variables will be discussed in order to provide a comprehensive view of the existing information and knowledge needs of the companies studied. First, data on perceived information needs will be scrutinized in relation to different decision-making processes in the enterprises.

The data given are self ratings. The interviewees were asked to describe their perceived information needs, focusing on different decision-making processes in the firm. The opinions expressed were then supplemented and clarified by asking the interviewees to rank these needs with respect to importance.

Table 13 presents the values of perceived information needs related to areas for decision-making processes in the enterprises. Individual rankings of perceived importance as well as median rankings for the two groups and the total material are given.

Table 13 shows the extent of perceived information needs originating from areas calling for decisions in the enterprises. It is obvious that the ranking profiles of the two groups are fairly similar. Both groups ranked information connected to decisions about products as most important and market-related information as number two. Both groups also gave needs with respect to organization and real estate the lowest ranking.

Table 13. Perceived Information Needs related to different Areas of Decision Making of the Enterprise. Presented figures refer to a place ranked importance. (1 = most important, 7 = least important).

Decision making process	GROUP 1 Participants										Nonpart		Group Rank	GROUP 2 Participants								Nonpart				Group Rank	Total Rank
	A	B	C	D	E	F	G	H	I	J	K	L		M	N	O	P	Q	R	S	T	U	V	X		
Products	2	2	1	1	1	1	1	1	1	1	1	1	(1)	2	1	2	1	1	1	1	1	1	1	1	(1)	(1)
Means of production	5	4	4	5	3	2	3	5	5	2	5	5	(4)	5	5	5	4	5	4	4	5	3	5	4	(5)	(5)
Market	1	1	2	2	2	3	2	2	2	3	2	2	(2)	1	2	1	2	2	2	2	2	2	2	2	(2)	(2)
Finans	3	3	3	3	4	5	4	3	4	5	3	4	(3)	3	4	3	5	4	3	5	4	5	4	5	(4)	(4)
Personnel	4	5	5	4	5	4	5	4	3	4	4	3	(5)	4	3	4	3	3	5	3	3	4	3	3	(3)	(3)
Real estate	6	6	7	6	7	7	7	6	7	7	6	7	(7)	7	7	6	7	7	6	7	7	6	6	7	(7)	(7)
Organization	7	7	6	7	6	6	6	7	6	6	7	6	(6)	6	6	7	6	6	7	6	6	7	7	6	(6)	(6)

Group 1 n=12
Group 2 n=11

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A number of broad categories of organizational information and knowledge needs can be derived from the analysis. Table 14 gives a summary of the description of such needs.

Table 14. Summary of the Description of Information Needs Related to Decision-making Processes in the Enterprise.

Decision processes in the firm		Information need	
Products	(1)	Technical	(1)
Market	(2)	Commercial	(2)
Personnel	(3)	Legal	(3)
Finance	(4)	Financial	(4)
Means of production	(5)	Procedural	(5)
Organization	(6)		
Real estate	(7)		

(Ranking order of importance in brackets)

Table 14 shows that the perceived information needs related to decision-making processes with respect to products, market, personnel, finance, means of production, organization and real estate can be summarized in five broad categories of information needs: Need of technical, commercial, legal, financial and procedural information. The needs were mentioned in the ranking order of importance found in this study. It can thus be concluded that the information and knowledge needs of the enterprises are largely dictated by the prevailing task and related decision-making processes.

The Field of External Preparedness

In the text below, the results of the diagnostic interviews will be presented as external preparedness at the organizational level. Societal norms, laws and regulations are considered to be frame factors for organizational activities, creating a climate of external preparedness.

The Influence of Norms, Laws and Regulations on the Organization

In order to provide data on organizational information utilization, the interviewees were asked about their opinions about the impact of societal norms, laws and regulations on the organizational activities of their respective company. These three related variables were treated together as a block variable.

The result shows that all the interviewees in this study felt that their respective company's decision-making processes and overall activities were affected by norms, laws and regulations, either to some extent (the managers D, H, J, N

and Q) or seriously (all other managers). The predominant feature of both groups was, consequently, statements indicating serious effects on organizational activities. The statements from the diagnostic interviews can be grouped into different categories with respect to the kind of influences on the organizations.

The predominant category refers to effects in terms of limited degree of freedom with respect to organizational action; the scope for freedom of action is limited. This opinion was shared by all interviewees.

> Laws, agreements, rules, conventions and regulations of various kinds increasingly restrict the company. The scope for action becomes very minimal. In all particular, small companies find this situation hard to manage. (A)

In this connection, there was also a general feeling about the obligation to hand in reports or information, e.g. different kinds of statistics, which is a heavy burden and difficult to satisfy and has negative influences on the ability to take organizational action.

> All obligatory information duties are a heavy task and difficult to handle and with consequences for your ability to act in the company. (C)

> As a manager of a small company you always feel a little maltreated because of public laws, rules, taxes and other restrictions. (S)

It was the general opinion of the managers that small enterprises are much more affected by external preparedness factors than larger companies because:

> laws, regulations and other decrees are based on society's perceptions of the situation of large companies. Large industries often have special departments and personnel resources to manage these things, but small companies do not have the same possibilities and are the victims of much more trouble in this respect. (E)

There were also statements pointing to variables of external preparedness being factors of uncertainty in organizational planning.

> Laws, taxes and other kinds of restrictions make organizational planning, especially long-term planning, very difficult. You never know what may happen tomorrow. Changes in laws and regulations, for example, stricter requirements about quality testing, may suddenly, over night, change the demands placed on the company. The company's goals and plans might not be valid or relevant tomorrow. (L)

> Norms, laws and a lot of other regulations are very crucial factors. Changes always create problems and can jeopardize the whole business. It's a serious uncertainty factor that makes you very cautious. (G)

> Often, you have to revise the company's objectives because of different political decrees. The risk of future decrees produces uncertainty. (I)
>
> The effect of laws, norms and the like is as if your company was suffering from internal cancer. Utter chaos can develop overnight. (B)

Finally, variables of external preparedness were said to cause a lot of work because there often seem to be difficulties in interpretation:

> Legislation, for example, traffic laws and labour laws, makes work very hard. Very often there is some uncertainty that causes trouble even to experts. You need a legal training to be able to manage reading these texts. (O)
>
> Labour legislation is like a jungle - you can't find your way either in or out. (R)
>
> The uncertainty of how to interpret different decrees makes you very cautious. If something happens, it is always the company that is responsible. You dare not take any risks. (M)

From the statements quoted above, it is evident that variables of external preparedness are important determinants of organizational activities, including information utilization.

The Field of External Resources

Below, I will present data on external resources at the organization level found by means of the diagnostic interviews.

First, the economic situation of the companies studied and its importance to organizational activity will be dealt with. Then the information barrier problems will be related to the organization's available information resources. This will be followed by a discussion of organizational characteristics with respect to technology. Finally, the importance of the variable *time* will be considered at the organizational level.

Economic Situation of the Firm

The economic situation of the firms was measured by means of self ratings made by the interviewees during the diagnostic interviews. To obtain a general picture, data on the volume of sales were collected. These data were then supplemented with assessments of perceived degree of freedom to act related to the economic resources of the companies. Table 15 presents the results for the two groups.

Table 15 shows considerable differences between the companies studied with respect to volume of sales with values ranging from less than SEK 1 million to

more than SEK 100 million a year. The results also indicate certain differences between the two groups: in Group 1, there was no company with sales larger than SEK 30 million, while Group 2 included three companies with sales of SEK 100 million or more.

As regards the assessments of the perceived degree of freedom to act related to economic resources, Table 15 shows a rather gloomy picture: most companies reported either major or some limitations on organizational action. The interviewees reporting major limitations considered the economic situation of their companies so depressing that they could not find any scope for action.

> You work in such a depressing situation that there is no scope...When you don't have the resources, you are not free to act. (O)

> The company is in a very weak and uncertain position with extremely low profitability. All the reserves have been used up and you cannot go on any longer. There is the risk that you must give up. We are in a kind of vicious circle of heavy expenses. (A)

The managers stating some limitations were of the opinion that in a small company, available funds are problematic and uncertain, which calls for cautiousness and composure.

Table 15. The Distribution of Company Sales (in SEK million) and Assessments of the Degree of Freedom of Organizational Action.

Unit of analysis	Trade	Case	SALES (MSEK)						Assessments of degree of freedom of organizational action
			- 4	5-9	10-14	15-19	20-30	100-	
Group 1 Partici-pants	W	A	x						Major limitations
		B	x						Major limitations
		C				x			Major limitations
		D		x					Some limitations
	M	E	x						Major limitations
		F		x					No limitations
		G				x			Major limitations
		H		x					Some limitations
		I					x		Major limitations
		J					x		Certain limitations
Non-parti-cipants	M	K	x						Major limitations
		L				x			Major limitations
Group 1 total			4	3	0	3	2	0	
Group 2 Partici-pants	W	M					x		Some limitations
		N						x	Some limitations
		O	x						Major limitations
	M	P			x				No limitations
		Q						x	Some limitations
		R		x					Major limitations
		S		x					Major limitations
Non-parti-cipants	W	T				x			Major limitations
	M	U		x					Major limitations
		V		x					Some limitations
		X						x	Some limitations
Group 2 total			1	4	1	1	1	3	
Total			5	7	1	4	3	3	

Group 1 n=12
Group 2 n=11

(For the effects of economical resources on information utilization, I refer to the following subsection. Compare also with the presentation of the importance of economic resources at the individual level of analysis, Chapter 5, Economic Resources.)

Library and Information Resources

From the diagnostic interviews it is evident that all the companies included in this study lacked a library and other information resources of their own. None of the companies had set aside economic resources specifically for information utilization. There were only certain technical texts, journals and monographs available. As presented in the discussion of information resources used with regard to the field of external resources at the individual level of analysis (see, Chapter 5, Sources of Information Used), there was a strong dependence on external resources to satisfy information needs.

During the diagnostic interviews, the interviewees stated that different barriers with respect to organizational external resources had negative effects on information utilization.

In spite of extensive use of external channels found at the individual level of analysis (see Chapter 5, Sources of Information Used), the results predominantly indicate a perceived lack of external contacts for meeting the information needs of the companies. The interviewees felt that the external contacts of the companies was restricted, which created a sense of isolation.

The result shows the predominance of economic resources in forming information barriers. As shown in the analysis of the economic situation of the firms (see Chapter 5, Economic Situation of the Firm), most companies studied reported a depressed economic situation with either major or some restrictions on organizational action. From the above data, it is clear that this limited degree of freedom also applies to the process of information utilization. (Compare Chapter 5, Economic Resources, dealing with influences of economy at the individual level.) At the organizational level of analysis, this barrier has two aspects; on the one hand, insufficient resources and on the other, difficulties in determining the cost-effectiveness of information seeking and utilization in comparison with other organizational activities.

> Difficult in determining the final profit from the process of information utilization. Effectiveness is of utmost importance in a depressed financial situation. Profitability is all that counts. (T)

> The problem is that there is no direct economic reward for information seeking, only indirect and far ahead. (S)

No company in this study had economic resources earmarked for information utilization.

In addition, the result indicates the presence of barriers related to the internal administration of the companies. The lack of internal routines for information storage and retrieval was particularly often assumed to be a serious barrier to information utilization. Consequently, not only the processes of information seeking and transfer are troublesome, but the subsequent processes of storage and retrieval within the company also constitute serious barriers; there is only a vague idea about how to handle large information flows. Furthermore, a lack of

routines for planning and development was in some cases presumed to have negative effects on information utilization. From this account it can be concluded that the extent of existing administrative routines constitutes an important determinant of information and knowledge utilization.

Finally, the importance of internal communication in information utilization is indicated. Problems in the internal communication flow in the organization were supposed to have a hampering affect.

Technology

In the description of organizational characteristics, with respect to technology, three aspects will be considered. Technology will first be dealt with in terms of level of technology based on assessments of the mechanization development level of the companies. Next, the technical innovativeness of the product will be discussed. These two aspects are intended to provide a comprehensive view of the degree of technical orientation of the companies studied. Finally, data will be presented with respect to the impact of technology on information utilization.

The assessments presented are based on the diagnostic interviews and are self ratings. Data on the technology level were also collected during the researcher's own observations at the companies.

The classification scale presented by Wingårdh (1970) has been used as a basis for forming a judgement of the level of technology of the companies. The scale is based on the gradual transition of control from man to machine, placing the variable of mechanization along a hypothesized continuum divided into seventeen scale steps, from a low level to a high level of technology: a low level (scale step 1 - 4), a medium level (scale step 5 - 11) and a high level (scale step 12 - 17).

In an open question, the interviewees were asked about their assessments of the mechanization level with respect to the production processes in their companies. The assessment was made in such a way that it focused on the most significant level of technology in each case. These self ratings were compared with observations made by the researcher and were then analysed and interpreted according to Wingårdh's classification scale. The assessments of technology in terms of mechanization level show the estimations of technology in the companies of the two groups, distributed according to level of mechanization.

From the analysis, it is evident that the level of mechanization varied among the companies. Most companies were, however, estimated to be at a low to medium level of mechanization (level 4) or at a medium level (levels 6, 9, 10 or 11). Only one company, P, had reached a high level of mechanization (level 13). All companies in the wood field were characterized by a low level of mechanization except cases C and N, which had reached a medium level.

The analysis can, however, be criticized as being too categorical and showing too static a picture of the real situation. An exhaustive observation of

the characteristics of the production processes in each company reveals that the situation is more complicated than the table shows. Observing the production line in each company, one usually finds that in one and the same company there are variations between different production operations; the characterization of mechanization becomes one of a mechanization profile for each company. Data from the diagnostic interviews and the observations made by the researcher show that the level of mechanization can vary from the lowest possible level (manual) to a fairly high level between different operations along the production line. If these characteristics are considered, every company studied can be said to have a mechanization profile of its own.

Turning to the second aspect, technology, in this subsection, Table 16 below presents data about the technical innovativeness of the products, according to the assessments made by the interviewees.

Table 16 shows the number of products in the companies studied and the assessments made by the interviewees of both the innovativeness and the frequency of change. In both groups, the number of products varied from a single product to several, with an assessed innovativeness from a low level to a high level in comparison with cutting-edge technology. It can also be seen that the change varied from only minor changes to large-scale annual changes. From the table it appears that the companies in the wood field were mainly characterized by few products with low a low level of innovativeness and only minor changes.

In the light of technology, presented above, the interviewees were given an open question about the impact of technology on information utilization in the companies These self ratings indicate that technology was an important determinant of information utilization in the small and medium-sized companies studied. In both groups, the general opinion of the interviewees was that a high level of mechanization and the innovativeness of the product increase the need for advanced technical information and that a low level of mechanization and low innovativeness of the product limits this need. Some statements may serve to illustrate these conclusions:

> The comparatively high technological level in the company increases your need for advanced technical information and makes it indispensable. (I)
>
> The low level of technology decreases your information needs. The possibility of implementing advanced technical information in production operations is not very good. (A)
>
> Not working at the technological cutting edge reduces your need for information. (S)
>
> In a highly innovative company, your need for information is almost insatiable. If you can't satisfy it, there will be a collapse. (E)
>
> The innovative character of the product calls for knowledge of the latest findings in the field. (P)

Table 16. Assessments of the Technical Innovativeness of the Products.

Unit of analysis	Trade	No. of state-ments	Case	Innovativeness of product in comparison to the technical front line			Number of products	Changes
				Low	Medium	High		
Group 1 Partici-pants	W	4	A	x			Few	Minor
			B	x			Few	Minor
			C		x		Few	Annually
			D	x			Few	Minor
	M	6	E			x	Several	Annually
			F			x	Several	Annually
			G			x	Few	Annually
			H			x	Several	Annually
			I		x		Several	Annually
			J		x		Several	Annually
Non-parti-cipants	M	2	K		x		One	Minor
			L		x		Several	Annually
Group 1		n=12		3	5	4		
Group 2 Partici-pants	W	3	M	x			Few	Minor
			N		x		One [1]	Minor
			O	x			Few	Minor
	M	4	P			x	Several	Annually
			Q			x	Few	Annually
			R	x			Few	Minor
			S		x		Few	Minor
Non-parti-cipants	W	1	T		x		One [1]	Annually
	M	3	U			x	Several	Annually
			V			x	One	Annually
			X			x	One [1]	Annually
Group 2		n=11		3	3	5		

[1] Essentially one product, but with variations.

These findings concerning technology show that a low level of technology in production operations and low innovativeness of products result in a limited need for information utilization. This thus indicates that technical orientation is an important determinant of managerial information utilization.

Time

In Chapter 5, the importance of the variable time was considered with respect to information utilization at the individual level of analysis. Here, time is the last variable of external resources to be dealt with at the organizational level.

The interviewees' assessments of the impact of time on organizational activity and information utilization, measured by an open question, indicate that the variable time is perceived as constituting a serious barrier to information and overall organizational activity. Almost exclusively, the interviewees felt that their degree of freedom in organizational action as well as their ability to meet the information needs of the company was seriously or to some extent hampered by lack of time.

Chapter 7

Society Level Antecedents

In this chapter, data are given on environmental variables at the society level. They are drawn from the diagnostic interviews.

The Field of Internal Resources

Results will be presented in terms of internal resources at the society level. Light will be shed on competency in society and on the importance of this variable to information utilization with a focus on information barrier problems.

Competency in Society

To obtain an insight into the way in which general competency in society is perceived, an open question was given to the interviewees during the diagnostic interviews. An overview of stated opinions is given in Table 17.

The predominant opinion in this study reflected a perceived lack of competence or inadequate qualifications in authorities and service organizations. It was assumed that this lack had negative influences on the ability to satisfy perceived information needs:

> You dare not trust answers from, for example, employer organizations. Nobody can tell you anything, that's the way it is, and no one will put his signature to anything, either. Consequently, it is always your own decision that counts. You are really committed to relying on yourself. (A)

> So-called 'experts' in the field cannot answer questions either. This forms a serious barrier to your ability to satisfy your information and knowledge needs. You are forced to rely completely on yourself to find a solution. (C)

Some of the response categories indicate shortcomings with respect to education. It was the opinion of the interviewees that there is a decreasing knowledge in society of materials with consequences for the industrial sector. One reason for this problem could be found in the technical schools and the fact that there is no longer any apprenticeship system in Sweden. Another reason given referred to the increasingly widespread mechanization and automation of industrial production. As regards educational matters, there were some opinions suggesting:

Table 17. Opinions about internal Resources in Society.

Opinion \ Unit of analysis	GROUP 1 Participants A	B	C	D	E	F	G	H	I	J	Nonp K	L	GROUP 2 Participants M	N	O	P	Q	R	S	Nonp T	U	V	X	Total	
Lack of competency within different authorities and service organizations	+	+	-	+	-	-	-	+	+	+	+	+	8	+	+	-	+	+	+	+	+	-	-	-	7	15
There is a decreasing knowledge of materials in society	-	+	-	-	-	-	-	-	+	-	-	+	3	-	-	+	+	-	-	-	-	-	-	-	2	5
Education is underestimated in Sweden today - it ought to be praised more highly	-	-	+	-	+	+	-	-	-	-	-	+	4	-	-	-	+	-	-	+	-	-	-	+	3	7
Difficult to employ qualified personnel	+	-	+	-	-	-	-	-	+	-	+	+	5	-	-	-	-	-	+	-	-	+	-	+	3	8
Investments on society's part in advances or development through education lack a straight line and are not sufficient	-	-	-	-	-	-	-	-	+	-	-	+	2	-	-	-	+	-	-	-	-	-	+	+	3	5
Increased knowledge is needed among politicians, social reformers, decision makers and so on about the particular situation of small industry	+	-	-	+	+	-	+	-	-	-	+	-	5	+	-	-	-	-	+	-	+	-	-	-	3	8

Group 1 n=12 Group 2 n=11 + = stated opinion - = no opinion

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> On the whole, education is rated too low in today's society; too little appreciation of qualifications is not a favourable climate for presumptive students. Training is far from always put to good use today. This fact causes a serious risk and will possibly affect the future standard of knowledge. The future is both an industrial problem and a national one. (P)

Other opinions pointed to the fact that small companies in particular have difficulties finding qualified personnel:

> From an employee perspective, working in large companies is much more attractive in terms of available resources of different kinds, perceived opportunities for personal development, qualification and promotion. The best people try to get a job in a large company. (X)

Finally, investment by society in educational programs were considered to be insufficient and characterized by large changes in direction and no consistent policy.

> Society ought to be built on a considerably more stable plan of the future than has been the case until now. Otherwise, it will be a half-hearted solution resulting in disjointed efforts which cannot satisfy the real demand. (I)

The last category reflects a general feeling among the interviewees that politicians are not sufficiently aware of reality to understand the situation of industry and small enterprises in particular. In the interviewees' opinion, politicians, reformers, decision makers and such people need knowledge of small enterprises as a more adequate basis of political decisions. (Data indicating this opinion can be found in the account of societal goals and intentions in the next section, The Field of Internal Preparedness.)

From this account, it is evident that variables of internal resources in society are also important determinants of information utilization.

The Field of Internal Preparedness

Societal Goals and Intentions

To obtain a comprehensive view of how current societal goals and intentions, as expressed by politicians and other representatives, were perceived the interviewees were asked to state their opinions when answering an open question. Another question was asked about what they expected the future would bring with respect to commerce and industry.

The perceptions of societal goals and intentions with respect to the commerce and industry and, in particular, to small and medium-sized companies, were predominantly negative. (Only H, J, N, U and V were positive.) However, in spite of the negative feelings about the current situation,

the expectations of what the future would bring were mostly positive. The managers had not lost hope; on the contrary they had dreams. It should, however, be noted that there were some exceptions. (C, K and X were negative; A, O and T were doubtful.)

Most interviewees argued, that "the goals of society and the goals of the firm do not coincide very often". In the main, the interviewees were very harsh in their judgement of national economic and industrial policies, as illustrated in the following statement:

> My view of societal goals and steps taken can be compared with forestry. It is like cutting the tops of the pines. Sweden is on the wrong course. The courage and motivation to execute great plans is defined by the resources one gets. (X)

The predominant opinion about societal goals and intentions from this study thus reflected anything but a motivating climate for small industries; it reflects the perception of societal goals creating a depressed, unfriendly industrial climate. (See further, The Field of External Preparedness, dealing with societal goals and intentions as manifested in laws, regulations and other societal decrees.)

A second category of statements concerned politicians and their qualifications as a basis of deciding policies with respect to commerce and industry; most interviewees raised questions. Above all, politicians were said to be out of touch with reality.

> The politicians' sympathetic appreciation of and intentions for economic life, especially the situation of small firms, gives cause for many a question mark. It's beyond their abilities to understand the role of the manufacturing industry. (C)

> The goals of society expressed by politicians are often questionable. Often, they are not sufficiently in touch with reality and they cannot fathom the problems a small company has to face. Look, for example, at Samhällsföretag. Many of the intentions there are a threat to small industries. (B)

> The political debate doesn't reflect the real problems sufficiently well. One ought to take better care of the opportunities for creating jobs and of the situation of small firms. (G)

Opinions were also expressed about societal intentions being suited to large enterprises and not to small ones.

> The intentions of society and politicians for industry are to satisfy the conditions of larger industries and not those of small ones; they only start from large companies. When it's a question of support to small industries, it mostly turns out to be nothing but words - with very little weight behind them and nothing in concrete terms. (T)

Finally, there were opinions that questioned the absence consistency in politics.

> Intentions and plans of society have oscillated violently time and time again; the trend for the future should instead be as stable as possible. The situation as it is adds to our feelings of uncertainty. (L)

To sum up, the account given of societal goals and intentions, presented above, indicates the importance of these variables to industrial activities. In this study, societal goals and intentions were mainly regarded as creating a depressed industrial climate with too little freedom for organization action. As a determinant of the motivational states, the perceived situation seems to have a general hampering effect on industrial activities, including development and change.

The Field of External Preparedness

Laws, Rules, Regulations and other Decrees

To obtain a general view of how variables of external preparedness were perceived, an open question was asked about this, supplemented by assessments of consequences for industry, including both favourable and negative facts.

It was the predominant feeling of the interviewees that laws, rules, regulations, taxes and other societal decrees create a depressing, unfriendly industrial climate with too little freedom. Only two interviewees, H and V, considered the industrial climate to be favourable, while J, N, P and U felt it was negative to some extent. All the others stated that the variables of external preparedness create a very unfavourable climate for industry. The general impression was that employee funds in particular constitute a serious danger to industry that could cast a pall on the future and that the tax burden was supposed to deprive the managers of opportunities, expectations and the desire and disposition for development and change.

> No help on society's part. My view of society is that of a beast of burden - employee funds, taxes, regulations and so on - this unpleasant climate results in less and less scope for action. (A)

> It's dangerous to carry out national experiments like employee funds during a time of problems and uncertainty. (B)

> The tough climate in society has become a vicious circle in the last decade - it doesn't motivate development and investments or industrial activities in general. (E)

In line with the perceptions of societal goals and intentions (see, Chapter 5, Societal Goals and Intentions), laws, regulations and other variables of external preparedness were also considered to be badly adapted to small enterprises.

> Laws, agreements, rules and the like are instituted for large enterprises and therefore cause a lot of trouble to small ones because they don't have the same prerequisites. Society ought to take the situation of small companies more into consideration. (T)

> The social conditions are serious for small enterprises, which are balancing hopelessly on a tightrope because of all the societal obligations. (K)

The Field of External Resources

In this section, external resources at the societal level will be presented. First, data on environmental influences will be dealt with in terms of market conditions after which the availability of information resources will be accounted for.

Market Conditions

To obtain an insight into environmental conditions which could affect information utilization, the interviewees were asked about their opinions by means of an open question. In addition, they were asked about their opinions about environmental characteristics in terms of stability versus change, simplicity versus complexity, market conditions and the importance of these variables.

The diagnostic interviews reveal that the interviewees in the study almost unanimously considered their environment to be characterized by rapid change and increased complexity. Only person O mentioned the characteristics of stability and simplicity. The reason he gave was the comparatively low level of innovativeness in his own field of work, the wood field.

Most interviewees felt that market conditions were troublesome. Only participant D in Group 1 and non-participants U and V in Group 2 reported favourable market conditions. In addition, the result indicates the importance of environmental conditions to information utilization. Most interviewees in both groups reported that environmental conditions affected their information utilization either to some extent or seriously. Only participants D and H in Group 1 and participants N, O and non-participants U and V in Group 2 saw no relationship between environmental conditions and information utilization.

The dominant impressions expressed during the interviews were a feeling of a rapidly changing environment and a tough market situation:

> The changes in the market are intense. You have to feel from where the wind is blowing. There is enormously tough competition in the market resulting in harsh market conditions; it's a very uncertain and sensitive world to work in. (A)

> Society and market conditions are troublesome and have become more and more sensitive and harsh. (O)

Managers of both wood industries and mechanical engineering industries found their situation affected by "an oppressive situation consisting of competition in combination with a shrinking market". This situation was largely assumed to have its origin in gambling on the part of society.

> The situation is very sensitive because of big changes in the market. There is great uncertainty - and this feeling is a problem with broad consequences. One dares not take the risk, and the resulting cautiousness doesn't make you willing to take action - your ability to take action is partly lost. The consequences stretch as far as to the activities involved in information seeking. (R)

The wood industry in particular was said to be in such a depressed state that it is a question of trade difficulties.

> The difficulties in the construction industry are getting even worse. The uncertain market situation with decreasing activity in the building industry is affecting the company as well as me as manager - you are afraid of staking too much. (A)

> Various steps taken by society have resulted in a drastic decrease in construction activities in a short time. (T)

> Housing construction is dropping disastrously as is the construction of weekend cottages. The market for our products is shrinking at the same time. All private consumption has decreased. Furniture is placed at the bottom of the list of priorities, and consequently the furniture industry has taken a beating. At the same time, there is money invested in the societal wood industry, which to a large extent makes the situation even worse. We had to cut back business from 150 to 60 employees. In this way, many a job was lost. (C)

The analysis above shows the importance of societal conditions to information utilization. The uncertain and rapidly changing environment with resulting shifts in market structure has negative influences on the individual's ability to take action and on the perceived conditions for information utilization. The general economic situation in society, the tough competition in connection with a shrinking market has a moderating and inhibitory effect.

Availability of Societal Information Resources

Data on the availability of societal information resources were collected by means of an open question during the diagnostic interviews. In Table 18, below, the resulting interviewee opinions are presented grouped in categories. The values presented refer to individual opinions in the two groups and to frequency measures in both groups and in the total material.

Table 18 shows the existence of various barriers with respect to the availability of information resources. From the opinion categories presented, it can be seen that not only a lack of information but also information overload constitute barriers:

> Too much unnecessary information without steering or guidance is a grave problem. If there is no change, there is a danger that difficulties will blind you to what is important. You no longer have enough energy for selective perception. (Q)

The stated information overload, controlled from outside the companies regardless of prevailing information needs, was thus assumed to have a general hampering effect on information utilization and points to a need for a larger degree of steering or selection in the information transfer process to small industries.

Table 18 also indicates barriers with respect to linkage, co-ordination and explicitness concerning the roles of different information sources available.

> There are too many suppliers covering almost the same information. This makes you rather confused when making your choice. A clearer distinction between different suppliers and facts about their respective roles is needed. (J)

It was the interviewees' opinion that these uncertainties were accompanied by insufficient knowledge of existing information resources and a need for marketing and other measures to increase one's awareness. (Compare with Chapter 5, Capacity of Information Seeking.) In this study, the stated linkage barriers reflected a perceived need of closer co-operation and communication between industry, particularly small companies, and various educational institutions in society.

> If a close relationship between industry and educational institutions could be established, much would be gained. It would be beneficial to both sides; experiences from practical industrial life to education, and greater opportunities to recruit adequately qualified personnel to small industries. The two sides could meet and learn from each other. (T)

> A closer relationship with universities and other kinds of educational institutions would satisfy the need for information about the latest technological findings, or on the whole to get along with what these institutions are concerned with. (E)

The co-ordination barrier has to do with

> shortcomings in the co-ordination between central authorities and industry, for example, government and national boards in relation to industry and industrial enterprises, which makes the enterprises suffer. (D)

Table 18. Opinions about the Availability of Information Resources.

Opinions	Unit of analysis	GROUP 1													GROUP 2												
		Participants										Nonp			Participants							Nonp					
		A	B	C	D	E	F	G	H	I	J	K	L		M	N	O	P	Q	R	S	T	U	V	X		
Information overload. Too much information without steering; selected information needed		+	-	+	-	-	+	+	-	+	+	-	+	7	-	-	+	+	+	+	-	+	-	-	+	6	13
Information is often initiated and controlled from the outside and not based on the information needs of the firm		-	-	-	+	+	-	-	+	-	-	-	-	3	-	-	-	-	+	-	+	+	+	-	-	4	7
Lack of appropriate and correctly treated technical information to put into practice		+	+	-	-	-	-	+	-	-	-	-	+	4	-	+	+	-	-	+	-	-	-	-	-	3	7
Insufficient links between industry and educational institutions		-	+	-	-	+	-	+	-	-	-	+	-	4	+	-	-	-	-	-	-	+	-	+	+	4	8
Coordination between different societal authorities and industry are not organized properly		-	+	-	+	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	+	-	+	-	2	4
The roles of different information resources are not made explicit		-	+	-	-	-	-	-	+	+	-	+	+	5	-	+	-	+	-	+	+	-	+	+	-	6	11
Available resources are unsatisfactorily known and need marketing		-	-	-	+	+	-	-	-	+	+	+	+	6	-	-	-	+	-	+	-	+	-	+	-	4	10
Inadequate societal information, difficult to get		-	-	-	-	-	-	-	-	-	-	+	-	1	-	-	-	-	-	+	-	+	-	-	-	2	3
Pitfalls in the information transfer process and communication problems		-	-	+	-	-	-	+	-	+	-	+	+	5	+	+	-	+	-	-	-	-	+	+	-	5	10
Training courses are often too expensive		-	-	+	+	-	-	-	-	-	-	+	-	3	-	-	+	-	-	+	+	-	-	-	-	3	6
The geographic location has bearing on information availability		-	-	+	-	-	-	-	-	-	+	+	-	3	-	+	+	-	-	+	+	-	+	-	-	5	8

Group 1 n=12 Group 2 n=11 + = stated as correct

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Table 18 also shows barriers related to the information transfer process. In the opinion of the interviewees, "the supply often takes too long, something that small enterprises cannot afford". The results also indicate interpersonal communication problems between the two parties in the transfer process, supplier and user.

> Communicating is sometimes difficult. I have a feeling that there are walls between us. (M)

> I feel we don't talk the same language, for example, when communicating with research institutes. (G; the same idea expressed in other wordings also by I and K)

During the discussions about the library's possible role in satisfying the information needs of small enterprises, the interviewees were very hesitant about the ability and qualifications of librarians when it came to trying to learn about and understand the problems of small companies. (Compare with, Chapter 5, Expectations of the Role of Libraries for Small Firms, and Opinions about Universities.) The communication problems also concerned difficulties in obtaining information about governmental decrees and regulations, and social welfare. (Compare with Chapter 6, The Influence of Norms, Laws and Regulations on the Organization.)

> Society doesn't care enough when it is a question of supplying information about, for example, legislation and insurance matters. (K)

> Often there are difficulties in our contacts with authorities and executives. (T)

The table also indicates barriers due to costs.

> Most training courses and other activities, offered to small enterprises, are too expensive in relation to these firms' general financial situation. Consequently, small firms often have no possibility of attending or participating in such activities. (C)

Finally, the geographical location of the firms was said to limit information utilization since it is not possible to find the same information services in a small peripheral village as in a town or city. The distance from the town, it was said, limited the companies' ability to utilize, for example, university resources.

Chapter 8

The Intervention Program and the Processes of Change

This chapter focuses on providing data on the characteristics of the intervention program and on describing the intervention processes in this study. Besides data on the program in terms of the choice of intervention, the goals of the intervention chosen and its quality characteristics, the reader will find a description of the planning and implementation of the development work.

Choice of Intervention

The diagnosis of antecedent conditions in terms of the managers' perceptions of their information situation, which directed the focus on barriers to the process of information utilization, revealed that variables from three levels of analysis were important determinants of the ability to satisfy the information needs of the small industries studied: factors found within the contextual unity of which the managers are a part at the individual, the organizational and the societal levels. Factors belonging to these levels of context were found direct, limit and adjust the individual manager's search for and utilization of information.

From these findings, it is evident that for a successful solution to the information barrier problems, there is a need for an intervention based on a holistic perspective which attempts to eliminate or at least minimize barriers on all three contextual levels. Such a large-scale task, which is very demanding, was, however, judged to be impossible within the framework of the project in question (see Chapter 1, The Setting of the Study); only the goal of solving a minor part of the complex of problems was considered realistic. Thus, despite the importance of a holistic perspective of the problems that requires consideration of the individual in his surrounding context (See, Chapter 2, A Context-bound Holistic Perspective of Research), it was decided to apply a limited change and developmental process aimed at minimizing only a minority of the inhibiting and modifying factors on the different contextual levels in the existing information situations of the managers in this study.

The results of the diagnosis of perceived barriers to the managers' information utilization, of which an account was given in Chapter 5, indicate that the information barrier problems can to a large extent be regarded as a problem that can be tackled partly by means of pedagogical measures. (See Chapter 5.). From this point of view, and the fact that this study was carried out in the field of Education, it became natural to apply a pedagogical intervention to the work on this project. This phase of the project can be seen as a process of change and development which attempts to eliminate or minimize certain barriers through active educational action; to be more precise, through a training and information

program directed at the managers included in the study. The educational intervention consisted of two subprocesses, Intervention I, a general elementary program, and Intervention II, an intensified program.

Aims of the Intervention

On the basis of the results of the diagnostic interviews (See, the chapters 5, 6 and 7), it was found that the primary goals of the intervention should be to eliminate or at least minimize crucial information barriers within the restricted domain defined above in order to increase the possibilities of information utilization within the enterprises studied and attain a more effective fulfilment of their information needs. To meet this main goal, it was decided to introduce pedagogical measures

- to increase the participants' knowledge of available information re sources, including library and university resources,
- to develop their knowledge of methods and means that help in information seeking, including information searches in libraries, and
- to cause positive changes in their affective states with respect to information utilization as well as with regard to the library and university resources (perceptions, beliefs, expectations, attitudes, etc.).

The intervention program can thus be regarded as an attempt to make the group studied aware of general information resources as well as library and university resources in order to pave the way for an increased interest in using these resources and, ultimately, in putting them to practical use for a more effective way of satisfying the information needs of the enterprises.

Major Events in the Intervention Process

The intervention included two processes, a general elementary program (Intervention I) and an intensified program (Intervention II). In the text below, a description will be given of the planning and implementation of both phases of the development work.

According to the discussions of the methodological issues relating to this project (see Chapters 3 and 4), the action-oriented approach used involved successive development of different activities based on experience obtained during the research process itself. This characteristic is valid not only for the research process but also for the processes of change and development included. Consequently, every decision taken to introduce new activities was based on diagnostic data collected during the research process. The interlinkage between separate units of work is evident from an overview of different phases of work

and principal activities during the research process given in the description of the conduct of the study (See Chapter 4, Conducting the Empirical Study, Table 3).

As can be seen from table 3, there was a planned time interval of six months in the research process between the treatments of the two groups under study. The entire intervention in this project comprises four separate units or intervention subprocesses: the elementary program for Group 1 and Group 2, respectively, and the intensified program for each group. The two sections of each program were fully comparable. Those managers, who for some reason were prevented from attending on the first occasion, received an invitation to the second meeting as well. The treatment of the separate groups originally intended was, however, maintained until the implementation of the intensified program.

Intervention I

The decision on both the planning, development and implementation of the development work was based on the diagnostic interviews, during which the preconditions for the intervention were identified (See, Chapters 5, 6 and 7). For Group 1, this diagnosis was carried out in the spring of 1983 and for Group 2 in the autumn of the same year. This problem exploration phase involved the establishment of contacts with potential participants.

The plan of action was implemented between August and September, 1983. Further discussions were held and contacts made with potential participants for the detailed planning and design of the intervention program. Among other things, a postal invitation was sent to the managers which included a brief outline of the forthcoming program and a request that they communicate their personal wishes in order to make the content as relevant and suitable as possible in accordance with the stated goals of the intervention. (Data on the quality characteristics are presented in the section Characteristics of the Intervention Program below.) In an enclosed questionnaire, the managers were asked to state their own perceived problems needing to be solved in their companies, which could form starting-points for showing relevant information channels and means of assistance in finding the necessary knowledge and an appropriate solution. They were also asked to specify their wishes with respect to choice of departments for study visits at Linköping University and with respect to the content of the rest of the program.

Besides these contacts with the potential participants, the planning of the program included choice of and contacts with resource persons for the program. All these persons were chosen on the basis of their qualifications and experience in fields of particularly relevance to the sphere of interest of the managers and to the established goals of the intervention. Another criterion of the choice was a stated interest in co-operating in the change and development work proposed and in contributing to its success. In addition to this researcher, the experts included, were teachers and researchers in different departments of science and technology, librarians at the university library and representatives of the Center

of Technology Transfer and the information and liaison offices at Linköping University. The detailed planning and design of the program was then carried out in collaboration with these experts, and the final invitations were sent to the potential participants in Group 1 and Group 2, together with a detailed schedule for the planned activities, in early October, 1983, and in April, 1984, respectively.

Twenty-one managers out of twenty-three announced their wish to attend the program; all except persons U and V in Group 2 (compare Chapter 5, Capacity of Information Seeking).

The elementary program, Intervention I, was carried out on 24 October, 1983, for Group 1 and on 9 May, 1984, for Group 2 in accordance with the schedule sent to the presumptive participants in advance together with the final invitation. Of the announced participants, seventeen came to the first meeting, all except persons K and L in Group 1 and T, U, V and X in Group 2 (an analysis of the drop-outs is given in Chapter 4). A representative of the Local Development Fund also attended the meeting. For some hours (4) in the late afternoon and in the evening, the participants visited Linköping University to be informed about and try out the knowledge and information resources available, including an overview of the collective body of technical, scientific or academic knowledge developed at Linköping University and learn about the possibilities of reaching the documented and stored international information resources to which libraries in general and Linköping University Library in particular can provide the key. The program comprised the following elements:

a) Presentation of Linköping University Library:

- Possibilities and resources in general;
- Visit to the branch library of natural science and technology and a guided tour of the collections;
- Demonstration of a few selected means of information seeking including important index and abstract publications (in particular Svenska Tidskrifts- och Tidningsartiklar, Engineering Index, Science Citation Index, Metals Abstracts), handbooks and encyclopedias (for example McGraw Hill Encyclopedia of Science and Technology); and
- On-line information retrieval, with demonstrations based on the needs and wishes of the participating managers.

b) Study visit to some university departments:

- Department of Mechanical Engineering
- Department of Physics and Measurement Technology

c) Presentation of the Center of Technology Transfer at Linköping University

d) Concluding discussions about university-industry co-operation and desirable steps to be taken in the near future.

The information given at the meeting was complemented by printed information materials about Linköping University and its resources in general, about the activities of and possible services provided by university departments of particular relevance to the participants as well as about the university library. The latter included a general guide to Linköping University Library, a general guide to information seeking (Linköpings Universitetsbibliotek, 1977) and a guide to index and abstract publications in the field of natural science and technology available (Linköpings Universitetsbibliotek, 1978a).

Intervention II

The decision to start a second intervention process was a direct consequence of the outcomes of the first phase of the development work, which showed the need for an intensified program, mainly concerning methods of information retrieval. These outcomes became the basis of the planning, development and execution of Intervention II and they can be said to be preconditions for or antecedents of this process of change and development, together with the outcomes of the initial diagnostic interviews (see also Chapter 9, Evaluation of Intervention I).

On the basis of the wishes, needs and preferences regarding a suitable time for the intervention, as expressed by the managers, an intensified program was developed offering further opportunities to make the latter familiar with university resources, especially the university library but also branches in the field of science and technology. In order to facilitate the creation of a comprehensive view of available resources, it was found important to present another branch library of the decentralized organization of Linköping University Library that might prove essential to meeting the information needs of the enterprises included in the present study, the branch library of Economics and Mechanics (KA). The other university departments visited were the unit for Material Physics and that of Surface Physics and Chemistry, both within the Department of Physics and Measurement Technology.

The main aim was to create a more profound insight into methods and means of information retrieval in order to increase the participants' personal ability to search for information which meets their information needs; in other words, to develop an understanding of the process of information utilization, including knowledge of existing resources, and skills in searching for information in libraries and in using different means of assistance. It was decided to achieve this aim by means of a combination of theory and practice and, accordingly, the program provided opportunities for practising information seeking in the library under the guidance of library staff. A mailed invitation to call attention to the program, including an outline of items in the forthcoming program, was sent to the presumptive participants (at the end of April 1984 for Group 1 and in the mid-November the same year for Group 2).

The intensified program was held on 14 May, 1984, for Group 1. All participants in the elementary program belonging to this group had accepted the

invitation to attend the second meeting but, for various reasons, some managers were prevented from participating. Thus, members A, B, F and H were the only participants at this meeting. The corresponding meeting for Group 2, and for the representatives of Group 1 who could not attend the previous meeting, was held on 5 December of the same year with four participants, D, G, J and Q. Consequently, of the five participants in Group 2, only Q attended. Despite persistent efforts it was, however, not possible to find a suitable time for a new meeting for those who were prevented from participating. (For an analysis of the drop-outs, see Chapter 4.).

Both meetings were similar in form and followed the schedule chosen in advance which was based on the goals of the intervention. The program focused on the perceived problems stated by the managers when they applied to attend the meeting. The most important questions raised were: what are the possibiliies for selective information retrieval, how is a personal profile for on-line information retrieval developed, what equipment is needed to be able to perform on-line searches in one's own company, how can searches be made of information about markets, competitors and legal questions.

After an introductory study visit to the Department of Physics and Measurement Technology, the work continued at different stations or workshops in the branch library of Economics and Mechanics led by information experts in the different fields: a marketing unit dealing with the use of indices and abstract publications (above all Business Periodicals Index) as well as handbooks (for example Swedish and International KOMPASS), a unit concentrating on how to use the library catalogues (the traditional card catalogue as well as the on-line LIBRIS database) as well as finding literature in the library (from catalogue to shelf), and finally a station for on-line searches in international databases (training in the construction of a search profile, search methodology, execution and evaluation of searches).

The intensified program was complemented by printed information materials: brochures describing the university departments visited, a guide to information searches in Economy (Linköpings Universitetsbibliotek, 1978b), a key to the use of the database LIBRIS, which contains the Linköping University Library catalogue, as well as materials on other university and research libraries in Sweden and finally, a short description of the main steps to be taken in the information search process.

Characteristics of the Intervention Program

In order too bring about the desired effects or changes, it was considered important to take experiences within the field of implementation research into consideration (see Chapter 3, The Intervention from the Perspective of Organization Development). Above all, the works of Rogers (1962) and Fullan and Pomfret (1977) on the characteristics of innovations related to the success or failure of their implementation should form a guideline for the design and implementation of the intervention in the project.

According to Roger's analysis, five variables stood out as being most important to whether an innovation would be accepted or not. These were: relative advantage, consistency, complexity, divisibility and communicability. According to the review of research presented by Fullan and Pomfret (op. cit.) there are two central traits which are related to implementation: the explicitness and the complexity of the innovation. Research on innovations indicate that a low degree of perceived explicitness and a high degree of perceived complexity of an innovation interfere or postpone the adoption process (Rogers, 1962; Fullan and Pomfret, 1977).

In the present study, the concept of explicitness refers to the degree to which a program is clearly and explicitly presented. The concept of complexity refers to the degree to which the program is perceived as difficult to understand and use. (Compare, Gross et al, 1971; Ellström, 1984).

The choice of variables for the description of program characteristics is based on the intentions behind the design and implementation of the program with regard to the observations made in the field of innovation research (see, Chapter 3, The Intervention from the Perspective of Organization Development). Available program-related evaluation data include the following measures:

- Assessments of the relevancy of the program to practical work in the companies.
- Assessments of the importance of the content to practical work and of the overall values of the information given.
- Assessments of program quality in terms of explicitness and complexity.
- Assessments of organization and working forms.

In the following two subsections, these quality measures will be presented separately for Intervention I (the elementary program) and Intervention II (the intensified program). All quality measures presented are based on the evaluation interviews (See, Appendix 2) and are self ratings. The program-related variables of both interventions are fully comparable.

Intervention I – Characteristics

First in the description the reader will find measures of the relevance of the intervention program in relation to practical work in the enterprises.

Table 19 present the interviewees' assessments of this quality measure. The effects were measured by means of an open-ended question with four categories. In addition, supplementary self accounts were given.

Table 19 shows that the content of the elementary intervention program was, on the whole, perceived as fairly relevant to the work in the enterprises. The activities were ranked as either fairly relevant or very relevant.

Table 19. Assessments of the Relevance of the Intervention Program in Comparison to practical Work in the Enterprise.

Contents	Completely irrelevant	Fairly irrelevant	Fairly relevant	Very relevant
Library visit			B, D, G, I, J	A, C, E, F, H
Information about available means of information retrieval			D G, H, I, J	A, B, C, E, F,
Demonstration of on-line information retrieval			A, I, J	B, C, D, E, F, G, H
Visits to the university departments			A, B, C	D, E, F, G, H, I, J
Information about activities going on at, and ways of contacting, Linköping University			B, C, F, H, I	A, D, E, G, J
Group 1 n = 10				
Library visit			M, O, Q, S	N, P, R
Information about available means of information retrieval			M, Q, S	M, O, P, R
Demonstration of on-line information retrieval			M, P, S	N, O, Q, R
Visits to the university departments			P, O	M, N, Q, R, S
Information about activities going on at, and ways of contacting, Linköping University			P, Q, N, O	M, R, S
Group 2 n = 7				

As regards the program-related outcomes, perceived importance of the program to practical work and the perceived overall value of the information given, the interviewees were asked to give their assessments using a five-point scale with the endpoint 5 indicating the most positive value. In Table 20 below, the measures collected are presented for the two groups.

Table 20. Assessments of the Importance of the Content of the Program related to practical Work in the Enterprise and of the overall Value of the Information given. Measures from 1 to 5 with 5 being most positive.

Unit of analysis	Trade	No. of statements	Case	Importance in comparison with practical work	Overall value of information given
Group 1	W	4	A	4	4
			B	2	2
			C	3	5
			D	4	4
	M	6	E	4	4
			F	4	3
			G	4	4
			H	4	3
			I	4	4
			J	4	4
Group 1 n = Mean		10		3.7	3.7
Group 2	W	3	M	3	3
			N	3	5
			O	2	3
	M	4	P	4	4
			Q	5	4
			R	4	3
			S	4	3
Group 2 n = Mean		7		3.57	3.57
Total n =		17		3.65	3.65

The values presented in Table 20 indicate a positive trend. Most interviewees considered the content of the program to be fairly important to their practical work and their ratings were positive. There were, however, some individual variations. The cases B and O felt that the program was not very important to practical work.

In Table 21, below, the quality of the program is described in terms of participant ratings of explicitness and complexity. The assessments concern the degree to which the program was clearly and explicitly presented and the degree to which it was difficult to understand.

The participants' opinions were measured by means of a 5-point rating scale, where the value of 5 indicates a high degree, and the value 1 a low degree of rated quality. The question comprised three items measuring the adequacy of the scope as well as the ability to follow and understand the content presented. The end points of the three scales were verbally defined as insufficient - sufficient, difficult to follow - easy to follow and difficult to understand - easy to understand.

Table 21. Participant Ratings of Program Presentation

Case	Adequacy of scope	Explicitness	Comprehension
A	4	5	5
B	4	3	3
C	3	4	4
D	4	5	5
E	4	5	5
F	4	4	4
G	4	4	4
H	4	4	4
I	4	5	5
J	4	5	5
Group 1	3.9	4.4	4.4
M	3	4	4
N	4	4	4
O	4	3	3
P	5	5	5
Q	4	5	5
R	3	4	4
S	4	5	5
Group 2	3.86	4.29	4.29
Total	3.88	4.35	4.35

Group 1 n = 10 Group 2 n = 7 Total n = 17

If the values given by the two groups are considered, it is found that the participants were generally satisfied with the way in which the elementary program was presented. The rated quality in terms of explicitness and complexity was generally high, indicating that the scope was adequate and the presentation easy to follow and understand. The somewhat lower ratings of the adequacy reflect the opinion of the participants that searching for information is a difficult task. They expressed that they needed a deeper insight into the mystery of this complicated process.

The participants' attitudes towards the organization and work forms of the program were also measured by means of a 5-point scale. The seven items concern advance information, schedule, practical arrangements, participant composition, administration and guidance, time of execution and forms of work. Table 22 shows the individual values obtained and the means for the two groups.

Table 22. Assessments of the Organization and Work Forms of the Intervention Program. Measures on a 5-point scale from 1 to 5. (5 = most positive.)

Unit of analysis	Trade	Case	Organization: Advance information	Schedule	Practical arrangements	Participant composition	Administration, guidance	Time of execution	Forms of work
Group 1	W	A	5	4	4	4	4	4	4
		B	4	2	4	4	3	3	2
		C	4	4	4	3	4	4	4
		D	4	4	4	4	4	4	4
	M	E	5	5	5	4	5	5	5
		F	3	4	4	4	4	4	4
		G	4	4	4	4	5	4	4
		H	4	4	4	4	4	4	4
		I	3	4	4	4	4	5	4
		J	4	4	4	4	4	5	4
Mean	n = 10		4	3.9	4.1	3.9	4.1	4.2	3.9
Group 2	W	M	4	4	3	4	3	4	4
		N	4	4	4	4	4	4	4
		O	3	3	4	3	3	3	3
	M	P	5	5	4	2	5	5	4
		Q	4	4	4	3	4	4	3
		R	4	3	4	4	4	4	3
		S	4	4	5	3	4	3	3
Mean	n = 7		4	3.86	4	3.29	3.86	3.86	3.43
Total	n = 17		4	3.88	4.06	3.65	4	4.06	3.71

Table 22 also gives information about the attitudes of the participants towards the intervention program. In the main, the organization and work forms of the program were perceived as fairly satisfactory.

However, a few critical points were raised. Participant B, a member of Group 1, had certain objections to the schedule and the forms of work implying that "it was a rather boring evening". However, he could not suggest a better alternative. Participant P in Group 2 did not find the group composition very suitable either, arguing that a group consisting of only technicians and engineers with some kind of intellectual fellowship might have been preferable to a mixed one.

Intervention II Characteristics

In the text below, the different quality measures of Intervention II will be accounted for in the same order as in the description of Intervention I.

The self-report measures concerning the relevancy of the contents are based on 4-point rating scales, with the end-points defined as totally irrelevant and very relevant. The remaining measures of the implementation of the program used a 5-point rating scale where the value 5 indicates a high degree of rated quality.

Table 23 below specifies the data collected on perceived relevancy of the program.

Table 23. Assessments of the Relevancy of the Intervention Program to Practical Work in the Enterprise.

Contents	Totally irrelevant	Fairly irrelevant	Fairly relevant	Very relevant
Library visit	-	-	B, D, G, H	A, F, J, Q
Instructions and exercises on how to search for literature in libraries	-	-	D, G, H	A, B, F, J, Q
Demonstrations of and exercises in using different means of information retrieval: catalogues, bibliographies, handbooks, etc.	-	-	B, F, G, H	A, D, J, Q
Visits to university departments	-	-	A, Q	B, D, F, G, H, J

n = 8

Table 23 shows that all elements included in the intensified program were rated as being fairly or very relevant to the practical work in the enterprises. These values indicate that the intentions expressed by means of the design and implementation had been satisfactorily met. Most participants were of the opinion that the content, activities and subjects treated were of great practical value to their work in their enterprise.

Additional data on the value of the program are available in the form of participant assessment of its importance to practical work and of the overall value of the information given. Table 24, below, presents the individual self-ratings obtained as well as means.

According to Table 24, the participant ratings indicate that the program was successful in this respect. It is also clear that the overall value was more important than the value related to practical work. Most individual values ranged from 3 - 4 and 4 - 5 for the respective measures. The managers gave predominantly the reason that the most valuable outcome was preparedness for the future rather than knowledge that could be implemented immediately. The only exception to the generally positive tendency was person B, who scored low in both cases.

Table 24. Assessments of the Importance of the Program to Practical Work in the Enterprise and of the overall Value of the Information given. Measures from 1 to 5. (5 = most positive.)

Case	Importance to practical work	Overall value of information given
A	5	5
B	2	2
D	3	5
F	3	5
G	3	4
H	3	4
J	4	5
Q	4	4
Mean	3.38	4.25

n = 8

In Table 25, below, the quality of the program is described in terms of participant ratings of explicitness and complexity. Here, assessments concern the degree to which the program was clearly and explicitly presented and the degree to which it was difficult to understand. (Compare the corresponding outcomes of intervention I, Chapter 8, Intervention I – Characteristics).

Table 25. Participant Ratings of Program Presentation. (5 = most positive).

Case	Adequacy of scope	Explicitness	Comprehension
A	4	5	5
B	3	2	2
D	3	5	5
F	4	4	4
G	4	5	5
H	4	4	4
J	5	5	5
Q	4	5	5
Mean	3.88	4.38	4,.8

n = 8

Five-point rating scales were used, the same as those used to measure the outcomes of the elementary program. A value of 5 indicates a high degree and a

value of 1 a low degree of rated quality. The scale comprised three items measuring the adequacy of the scope, and the ability to follow and understand the contents presented. The end-points of the three scales were verbally defined as insufficient - sufficient, difficult to follow - easy to follow and difficult to understand - easy to understand.

In all three scales, the values for the sample as a whole were fairly high, especially for rated explicitness and comprehension. This indicates that the participants were fairly satisfied with the program in this respect: the presentation was easy to follow and to understand. The somewhat lower ratings of the adequacy of the scope reflects the participants' perceptions of information seeking as a complicated process. The values obtained were in line with the positive trend.

As regards the assessments of the quality of the program with respect to organization and work forms, Table 26 shows the self-report measures obtained by using a 5-point scale. Individual values as well as means for the entire sample are distributed. The seven items on the scale are the same as those measuring the outcomes of the elementary program (See Chapter 8, Intervention I – Characteristics).

Table 26. Assessments of the Organization and Work Forms of the Intervention Program. Measures on a 5-point Scale.(5 = most positive.)

Organization Case	Advance information	Schedule	Practical arrangements	Participant composition	Administration guidance	Time of execution	Form of work
A	5	4	5	5	5	5	5
B	3	3	4	3	3	2	3
D	5	5	5	3	5	5	5
F	4	4	4	4	4	4	4
G	3	4	4	4	4	4	4
H	4	4	4	4	4	4	4
J	5	5	5	5	5	5	4
Q	4	4	3	2	5	5	4
Mean	4.13	4.13	4.25	3.75	4.38	4.25	4.13

n = 8

The picture emerging from Table 26 of the rated quality of the organization and work forms of the intensified program indicates that the program was successful in this respect. The form of work with plenty of scope for the participants to practise searching for information in the university library under the guidance of library staff, was considered to be very suitable. As can be seen, most of the individual ratings are 4 or 5, resulting in mean values higher than

4 for the entire sample, with the exception of the assessments of participant composition. As in the case of the elementare program, some participants were of the opinion that a homogeneous group of, for example, technicians might have been preferable to a mixed group.

Chapter 9

Outcomes of the Intervention Process

In this chapter the outcomes of the interventions, that is, the products or effects of the intervention program, are described.

In Chapter 3, (see The Intervention in the Perspective of Organization Development), the intervention was characterized as training programs mostly focusing on the individual and not directly on the organization; in other words, it was a human processual type of intervention (Friedlander and Brown, 1974; Ellström, 1984) with the main aim of having an effect on individual knowledge, insight and perceptions or affective states. Consequently, it was anticipated that certain effects on individual perceptions, attitudes and skills would be observed but that the effects on the organization *per se* would be less.

The intervention program included two parts, a general introductory part (Intervention I) and a follow-up part (Intervention II). Both phases of the program were evaluated six months after the completion of the training (see Chapter 4, Conducting the Empirical Study, Table 3).

Both interventions were evaluated in a comparable way using the interview technique (described in Chapter 4, Methods of Data Collection) mainly focusing on individual-related outcomes with respect to knowledge and affective states by means of assessments of the own development of the individuals affected by the intervention, and on the degree of implementation in terms of practical use of information resources. Light was also shed on possible organization-related outcomes, that is, perceived effects within the companies studied. Finally, program-related outcomes were considered, including aspects of its perceived success.

The choice of outcome variables for the two evaluations was based on the stated goals of the intervention (see Chapter 8, Aims of the Intervention). According to Friedlander and Brown (1974) and Ellström (1984), a distinction is made between two subcategories of outcome variables: human-processual variables and performance variables.

Human-processual outcome variables refer to the effects of an intervention at the individual level with respect to individual knowledge, insight and affective states such as perceptions, beliefs or attitudes. In other words, this subcategory includes variables of internal individual development.

Performance outcome variables refer to the effects of an intervention at the individual or organizational level with respect to behavioural and technological or structural changes. Consequently, this subcategory refers to variables of external development including individual and organizational behavioural changes. This definition differs from the one of Friedlander and Brown (1974) and Ellström (1984) since these authors exclusively refer to effects at the organizational or group level.

From the text above, it is obvious that the anticipated outcomes of the intervention of the present project are mainly effects of the human-processual type.

The values presented in the description of outcome variables are based on self ratings given in the evaluation interviews. For the interpretation of these results it is important to consider the fact that the outcomes of the intervention may not be considered as final effects of the intervention program. Instead, the values presented refer to measures possible to manage depending on the frame factors of this project with respect to available time and economic resources and so on. Consequently, the outcomes presented in this monograph have the character of short-term effects.

Evaluation of Intervention I

In this section, the results of the first phase of the intervention will be presented, that is, the effects of the introductory program.

Human-Processual Variables

A description will be given below of the effects of the program at the individual and organizational levels with respect to knowledge, insight and affective states. In the discussion, variables measuring personal development with respect to insight and knowledge, perceived change of attitudes and program related outcomes will be dealt with.

Personal Development with Respect to Insight and Knowledge

Data on the effects of the elementary program in terms of insight and knowledge were gathered by means of an open question about the self-ratings of the participants of effects in general, and an open-ended question was given to obtain specific details. In the open-ended question the interviewees were asked to assess their own self-development on a 4-point scale. The scale points reflected different levels of development with the end points verbally defined as Not at all and To a very large extent. The eight items included were chosen on the basis of the goals of the intervention (see Chapter 8, Aims of the Intervention.

The results of the open-ended question show that according to the participants' ratings of their own self development, considerable effects were attained with respect to knowledge and insight, which showed that the goals of the intervention had been met. Most of the participants in both groups stated, to some extent or to a very large extent, that changes in the form of increased insight into information seeking as a process as well as available information resources and means of assistance had occurred. These effects included knowledge of university resources and services and of the library, particularly the university library.

To get closer to the reality reflected by the values, the answers to the open question will be presented below:

> Cudgelling one's brain about facilities for information utilization was very valuable. I realize that having increased my insight into this domain of knowledge is an important investment for the future. You must have orders tomorrow, too! The information was really something to remember so that you realized the potential of keeping an eye open for developments and taking a stand on your own decision-making. (A)
>
> By having observed how the library functions, I see how I can use it. But this wasn't enough - going in depth into the mystery of information seeking and practising it might be the thing to do after this introductory overview. (B)
>
> It is important to know about available information resources. I have learned a lot about what you can expect to get. Now I realize that the library has an essential role to play for my company as regards technology matters as well as marketing. Further knowledge of how to practise information seeking in the library under guidance would be fine. (C)
>
> I realize what resources are available and where, to the extent that I know where to turn. In small enterprises you usually don't have the necessary qualifications in this domain. For me as a manager of a small industry, it's a strength to know that there are possibilities and there ought to be a lot of opportunities for use. As an introduction the program was very good, providing a little of everything and stirring up interest. However, I want not only a smattering of information, but also deep insight into means of information retrieval, methods of information seeking, patents, etc. (D)
>
> The program was an excellent gateway to the university, the library and other departments. Nowadays, I walk around as if I owned the shop and have established essential collaboration. (E)
>
> I still have a lot to learn, but a general overview was appropriate as an introduction to the field. Now I realize the possibilities of meeting your information needs in a different way than before. The library resources like the on-line information retrieval was perhaps the thing I was most impressed by. I didn't really know that libraries could be used for such things. (F, the same idea expressed in other wordings also by H)
>
> The program gave me some ideas about existing possibilities that I didn't know about before. I didn't know, for example, that libraries have such facilities as computerized information retrieval. Therefore, I have realized that I can get service I never thought of before! Everything was very diffuse at the time. Having got rid of the uncertainty and anxiety I felt earlier is of utmost importance to me, but more knowledge is needed - this is like a kick-off for what will follow. (G)

I now have a quite different understanding even if there is still a lot lacking. I don't, for example, know how to go about finding literature at the library. I'm in great need of methods for information seeking as a follow-up. I want to learn to use the library and different means of information retrieval available there. (I; the same idea expressed in other wordings also by J).

The program provided me with a view of something I didn't have the slightest idea about before. It really was something new. I feel I that I have been prepared for future problem solving, and my interest in learning even more about activities going on at the university has been aroused. (M)

Very useful as a preparation for the future. Excellent to be informed of where and how. I feel more secure in my information seeking. (N)

Provided preparedness. I know the resources and where to turn to solve a problem. Until my visit, I was a little frightened of what the program might imply, but I was very impressed especially with the possibility of computerized information retrieval - that would really be something! I hadn't the slightest idea that such fantastic resources existed. Until now, I hadn't thought of the library's potential for solving informational problems. I now realize that I have been quite an outsider. (O)

The information was very well-balanced and provided enough to use as a basis for one's own initiative and for passing on to my staff. (P)

Now, I'm aware of the information supply offered, but I lack practice. I want to know more about the library and about how to find literature there; more about methods. The university was unfamiliar to me before, but has become familiar. It was a very effective kind of marketing. (Q)

Important preparation for future problem solving. I didn't know library work was done in that way; with, for example, computerized information retrieval. It was really something to remember. Of course, there is a need for deeper studies, theory as well as practice, and for other visits to certain departments like those of Physics and Measurement Technology and Mechanics. (R)

I've got a clearer grasp of what the university stands for. I know what I can get out of it: possibilities and limitations. Before, I was ignorant of the fact that you are allowed to use the university library as an outsider. It's important for development and the future, which makes me look ahead. However, more knowledge is needed. (S)

From this presentation of participant ratings of the effects of the program with respect to knowledge and insight, it can be concluded that the elementary program was perceived as being very successful. Large effects on individual knowledge and insight were attained through the badly needed survey of existing facilities and information resources provided by the program; changes occurred, which for most participants were said to be very closely related to

their fields of activity as managers of small industries. For several participants, a previously very apparent uncertainty about information utilization had been reduced and replaced by understanding, which was said to create an important state of preparedness for future problem solving.

Besides the changes accomplished, the findings did, however, also point to needs for deeper insight into the mystery of information seeking. Above all, these needs included further insight into means of information retrieval and methods of information seeking, theory as well as practice. But a wish for further knowledge about the university resources in general, preferably acquired through study visits, was also expressed.

Perceived Changes in Attitudes

The human-processual outcome variables to be dealt with here are effects of the program with respect to individual affective states such as perceptions, beliefs or attitudes. The measures reported are of three kinds:

- perceived changes in attitudes towards information utilization,
- perceived changes in attitudes towards the library as an information re source, and
- perceived changes in attitudes towards the university as a resource for small industries.

Attitude changes in these three respects were reported by the participants by means of self-ratings of the degree of self development. An open question was used, supplemented by an open-ended question. In addition to perceived positive effects, the open-ended question also enabled the respondents to indicate perceived negative effects and no changes.

The majority of the participants in both groups reported perceived changes in attitudes towards information utilization. These changes involved greater interest in information-seeking activities and utilization as a result of the intervention. The general opinion of the participants was that this attitude change had its roots in personal development with respect to knowledge and insight acquired during the program (see Chapter 9, Personal Development with Respect to Insight and Knowledge). A minority (B, C and E in Group 1 as well as P, Q and S in Group 2) stated, however, that their interest had not changed. They all gave as their reason that they had been interested in and aware of the importance of information and knowledge utilization before participating in the intervention process. No negative effects, indicating decreased interest in information utilization, were found.

The results of the interviewee ratings of the effects of the intervention program on attitudes towards the library as a resource indicate almost only positive effects for both groups; changes involving a sharply increased interest in libraries as essential sources for satisfying the information needs of the companies. Only one person, J (member of group 1), stated an unchanged view

due to his previously stated positive opinion about libraries as important information providers. No negative opinions (indicating negative effects of the program) were found.

In comparison with the antecedent values obtained during the diagnostic interviews, these changes appear even more positive. The picture of personal opinions about or attitudes towards libraries as well as of expectations as to the role of libraries in small and medium-sized companies, revealed in the presentation of antecedent variables, showed predominantly vague or negative opinions and expectations of the role of the libraries. (See, Chapter 5, Perceptions of Libraries, and Expectations of the Role of Libraries for Small Firms.) The comparison shows that the program in several cases transformed previous negative beliefs and expectations concerning the role of libraries into very positive ones. (Compare with the participant statements presented in Chapter 9, Personal Development with Respect to Insight and Knowledge) The participants have become aware of the important role that libraries can play in satisfying the information needs of small companies.

As regards the effects in terms of changed attitudes towards the university as a resource for small industries, most participants reported perceived positive effects of the intervention program. Fourteen interviewees out of seventeen reported greater interest in this resource after attending the program, while the remaining three cases (A, B and D, members of Group 1) stated that there was no change. No negative opinions about diminished interest were found.

Program-related Outcomes

Program-related outcomes of the introductory intervention to be dealt with here are of two kinds, assessments of the gains from the program and attitudes towards future participation in information programs or workshops on information utilization.

The former outcome was measured by a 5-point scale with the end point 5 indicating the most positive value of rated quality. The four items used concern aspects of program success with respect to (a) stimulating element of managerial work, (b) knowledge and insight, (c) contacts and (d) pieces of information and material, etc. of practical value.

Table 27 shows approximately the same positive facts as those presented earlier in this section, indicating that the program was also fairly successful as regards the perceived overall gain. There were few answers indicating less positive assessments and these concerned almost exclusively the third item, gain in terms of valuable contacts; the participants B, N and O were of the opinion that the program was too brief to facilitate useful contacts with university experts.

The last measure of program-related outcomes to be presented concerns participant attitudes towards future participation in information programs or workshops on information utilization. As is apparent from the account of outcomes from the introductory program thus far, the participants generally

considered the program to be a success. It was said to be efficient beyond all expectations in meeting the needs of the managers for information about available information resources and to be something worth keeping in mind. Large effects on individual insight, knowledge and affective states were found. Above all, the participants were given a badly needed survey of existing facilities and information channels which, they said, aroused their curiosity and interest in learning more about information seeking in detail. Accordingly, during the evaluation interviews, spontaneous requests were made for an intensified program. In response to a direct question, all participants, except N and P, said that they wanted to participate in a follow-up program - if it was possible to arrange. The persons N and P were of the opinion that the introductory program had met their needs. What they needed above all was a general overview of available information resources.

Table 27. Assessments of the Profit (Success) of the Program. Measures on a 5-point Scale from 1 to 5; 5 = Most Positive.

Unit of analysis	Trade	No. of statements	Case	Profit			
				Stimulating element of work	Increased knowledge	Valuable contacts	Hints, material of practical value
Group	W	4	A	4	4	4	3
			B	4	3	2	4
			C	5	4	3	4
			D	4	4	3	3
	M	6	E	3	3	4	4
			F	4	4	3	3
			H	4	3	4	3
			I	3	4	3	4
			J	4	4	4	3
Group 1 n =		10					
Mean				3.9	3.7	3.3	3.5
Group 2	W	3	M	4	3	3	3
			N	2	5	2	5
			O	3	5	2	3
	M	4	P	4	3	4	3
			Q	3	4	3	5
			R	4	3	4	4
			S	4	3	4	4
Group 2 n =		7					
Mean				3.43	3.71	3.14	3.86
Total n =		17		3.71	3.71	3.24	3.65

Almost all the participants wanted an intensified program to concentrate primarily on providing them with a deeper insight into methods of information

seeking by combining theory and practice. In concrete terms, the participants wanted instructions about and exercises in information search strategies, and demonstrations of and exercises in using different means of information retrieval such as databases, catalogues, bibliographies, indices, handbooks, etc. (See Chapter 9, Personal Development with Respect to Insight and Knowledge.)

Participants also expressed a wish to make study visits to other university departments. Being informed on the spot by experts from the different departments was said to be more effective than information in any other shape due to the available points of reference; being able to rely on such experts would facilitate the individuals' learning processes:

> I want to know even more about activities going on and resources available at the university. Study visits are extremely important - you have to see with your own eyes to really understand what it's all about and to enable generalizations to your own enterprise. (B)

> Being allowed to go around looking at things and arriving at a conception or view of your own make it easier to ask questions. I'm looking forward to further visits. (G)

Performance Variables

The effects of the intervention program on individual information utilization behaviour and on changes at the organizational level are described below .

Effects in terms of perceived behavioural change will be dealt with first. Included here are overall effects on the performance of the individual information utilization process. This will be followed by an account of answers to the question about the extent to which the program was adopted in terms of the degree of perceived implementation.

The values presented are based on the evaluation interviews, which aimed at measuring the outcomes of Intervention 1.

Effects in Terms of Perceived Behavioural Change

Effects in terms of perceived behavioural changes are defined here as the effects on the performance of the information utilization process, that is, the way in which information-seeking activities and utilization are carried out. The effects were measured by means of assessments of the self-development of the participants as a result of the intervention program.

Only a few participants (A, E and J in Group 1, P and R in Group 2) reported effects of the intervention program in terms of perceived behavioural change.

From the individual statements, it is evident that the perceived changes found involved an increased level of activity during the information utilization process, especially information seeking, based on an acquired awareness of the importance of information seeking and the new knowledge of available resources. The changes included a modified way of thinking as well as changed methods of

working. The developed process of information utilization was also characterized by the use of more sources, including sources not used before (see subsection Effects in Terms of Perceived Degree of Implementation). These effects can also be seen as widened information utilization profiles. The following statements serve to confirm these changes:

> Now, after the information program, I carry out my information searches more purposefully and, on the whole, I consider such things more. I consult printed sources more often to see what can be found. Indispensable information has come more within my reach. (A)

> Now, I see a wider area to search in and new sources have come into use. I also search for information more actively and with a new sense of purpose. (E; the same idea expressed in other wordings also by R)

> I search more actively during the information seeking process when I know what possibilities there are. My increased insight into existing channels and sources helps a lot. Before, I seldom searched in an analytical way. It was more like a haphazard process of trial and error. (J; the same idea expressed in other wordings also by P)

The participants stating no behavioural changes shared the opinion that, at the time of the evaluation, it was too early to perceive such changes, but that some future changes could possibly be expected.

Related to the effects of perceived behavioural change with respect to information utilization are effects in terms of amount of time devoted to this process. The answers to an open-ended question, that enabled the interviewees to indicate perceived positive and negative effects, show that only two persons, E and M, were of the opinion that the length of time devoted to information utilization activities had been increased as a direct result of the intervention. All the other participants reported no changes, stating the same amount of time as at the time of the diagnostic interviews.

Effects in Terms of Perceived Degree of Implementation

Measures of perceived degree of implementation, dealt with here, are of two kind. In the first place, the degree of implementation refers to the extent to which the resources presented were put to practical use. In the examination of this question, it was found important to consider not only practical use but also discrepancies between interest shown and practical use made of the resources. The intention was to focus on the discrepancy between interest and behaviour among the participants as reflecting an assimilative or accommodative way of learning; that is, whether the program content was internalized or not (see, among others, Bruner, 1977).

In an open-ended question on a 4-point response scale, the interviewees were asked to assess their own self-development in terms of perceived degree of implementation of different resources. The scale points were defined to reflect

different phases in the adoption process with the end points verbally defined by the following expressions: No current interest and Have already begun using. In addition, the participants were asked to give concrete examples of implemented changes.

From the discussion above, it follows that the measures obtained refer to individual-processual variables as well as to performance variables. However, the importance of focusing on the highest degree of implementation, changed information-search behaviour shown as use of resources in practice, made it appropriate to place these outcomes under the heading of performance variables.

Secondly, the degree of implementation refers to performance outcomes at the organizational level with respect to behavioural, technological or structural changes in the companies. Data are shown in Table 28.

Table 28. Perceived Degree of Implementation, Ranging from no Interest to Practical Use of Resources.

Resource	No current interest	Would like to use	Have decided to use	Have already begun using
University library	-	I, J	B, C, D, F, G, H	A, E
Printed bibliographies	-	I, J	B, C, D, F, G, H	A, E
Journals	B, G	C, F, H, I, J	E	A, D
Databases on-line	-	D, F, G, H, I, J	A, B, C, E	-
University	-	A	C, D, J	B, E, F, G, H, I
Group 1 n = 10				
University library	-	M, O, R	N, Q, S	P
Printed bibliographies	-	M, N, O	P, Q, R, S	-
Journals	O, Q	M, R, S	N, P	-
Databases on-line	-	M, O, P, Q, R	N, S	-
University	-	M, N, O, Q	P	R, S
Group 2 n = 7				

The table shows that a large proportion of the participants had decided to use and, in some cases had already begun using, different kind of resources, the university library resources as well as those of other departments at Linköping

University. For both kinds of resources, all participants reported at least increased interest.

The study indicated a discrepancy between interest shown and changed information-utilization behaviour in terms of use of resources. This discrepancy reflects different degrees of implementation. Some participants had, at the time of the evaluation, reached the highest level of adoption, while others had not come far.

When making a comparison between the antecedent values and the diagnostic interviews the account above, with respect to the degree of implementation, indicates considerable effects of the intervention program. The extent to which the primarily library resources were used is of vital importance. Since this differs from the diagnostic findings, indicating that the managers did not rate libraries highly or did not believe that libraries could play a role as effective information sources, it seems obvious that the intervention program was quite successful. Without exception, the participants reported at least some interest in using these resources after attending the intervention program. As a matter of fact, most participants had reached a level at which they were determined to use these resources, even if discrepancies were found between interest shown and changed information-utilization behaviour. Nevertheless, it seems apparent that the library resources and the way in which they can help meet the information needs of small enterprises have become part of the managers' awareness, and interest in using the library has been aroused.

As regards the second aspect of the degree of implementation, the question of actual adoption in the enterprises, the result shows that in the majority of the cases there were no performance outcomes in terms of behavioural, technological or structural changes in the enterprises. Only six of the seventeen managers (A, E and G in Group 1; M, P and R in Group 2) reported changes. The moderately low degree of organizational adoption found is, however, in line with the effects expected from this kind of program, a human-processual type of intervention mostly focusing on the individual and not directly on the organization. From this particular point of view, the outcomes of the program appear satisfactory (compare with what was said in Chapter 3, The Intervention from the Perspective of Organization Development).

The changes reported were of different kinds: A, M and P had passed on their new knowledge about available information resources and search techniques to their staff and stated that certain behavioural changes in the organization's information utilization had occurred. E reported that the production process and the marketing of products had been influenced by the intervention program, with the testing of products at the university as one consequence. G called in university expertise to computerize his stock-keeping and part of the production lines. R, finally, had applied to university experts to carry out a cost-effectiveness and structural analysis of the organization in order to meet the demands of a changing market. These efforts resulted in the incorporation of an industry with complementary production lines which resulted in large-scale structural changes.

Evaluation of Intervention II

Below, the outcomes of the second phase of the intervention are presented, namely, the effects of the intensified program. All measures presented are self-ratings from interviews held with the participants six months after the final training and include human-processual as well as performance outcome variables. Throughout the description, comparisons will be made with the outcomes of the elementary program to help create an understanding of the effects of both interventions taken together. This makes it possible to assess changes between the two programs reflecting the process of adoption.

Eight managers attended the intensified intervention program: A, B, D, F, G, H and J from Group 1 and only Q from Group 2. As a consequence, the data will be displayed without group separation. Nevertheless, it will be possible to follow general trends in the material as well as individual variations. (For an analysis of the drop-outs from the study and for an analysis of methodological issues of other kinds, see Chapter 4).

Human-Processual Variables

In this section, I will deal with the effects of the intensified program as regards internal individual development, including individual knowledge, insight and affective states.

Personal Development of Insight and Knowledge

In line with measures of the outcomes of the elementary program, the effects of the intensified program with respect to insight and knowledge were measured by means of an open question to obtain the participants' self-ratings of effects in general and by means of an open-ended question to obtain the specific details. (Compare with what was said in the section Evaluation of Intervention I, Personal Development with Respect to Insight and Knowledge).

In the open-ended question, which comprised eight items based on the goals of the program, the interviewees were asked to give their assessments of their own self-development with respect to insight and knowledge on a 4-category response scale. The aim of the question was to measure effects in addition to those of the elementary program.

According to the self-ratings of the participants, the intensified program had a large impact on insight and knowledge in addition to the effects already contributed by the elementary program. All individual values of the eight items of the scale were indicating changes within the range of "to some extent" and "to a very great extent".

The participants expressed their general opinion that the second phase of the intervention had successfully provided a greater insight into methods and means of information retrieval of which they had caught only a glimpse during the elementary program; An understanding of the process of information utilization had developed, including knowledge of existing resources, skills in information seeking in libraries and in using different means of assistance. This was said to be of great importance to their ability to manage information seeking successfully on their own. The visits paid to different university departments in the technical faculty were also said to have resulted in a greater understanding of the university's resources and services, and they wanted to put them to use.

Considering the outcomes of both interventions (compare what was said in the section Evaluation of Intervention I, Personal Development with Respect to Insight and Knowledge), it can be seen that all the interviewees reported additional effects on insight and knowledge. Participants B and Q also reported especially important changes as regards knowledge of available means of assistance, insights into how to search information and; person B reported changes with respect to knowledge of where to turn. Both argued that the design and implementation of the intensified program was very likely what caused such changes, most of all because of the opportunities given to practice information seeking on their own under the guidance of the library staff. It was however stated that, the information by itself was not enough.

Perceived Changes of Attitudes

The human-processual outcomes of the program to be dealt with here are expected effects in terms of perceived attitude change. The measures on which data are given are:

- perceived changes in attitudes towards information utilization
- perceived changes in attitudes towards the library as an information re-resource and
- perceived changes in attitudes towards the university as a resource to small industries.

These effects are analogous to the corresponding outcome measured by variables used in the elementary program. Attitude changes in these three respects were thus measured by means of self-ratings by the participants of the degree of self-development in answer to an open question given during the evaluation interviews.

The measures of perceived attitude change indicate almost only positive changes as regards effects on attitudes towards information searches and utilization. All participants, except D, reported increased interest in information-utilization activities as a concrete outcome of the intensified intervention program. Person D, who found that no effects were evident, was of the opinion that the elementary program had already made him aware of the importance of information

utilization and aroused his curiosity to such an extent that further changes were difficult to distinguish.

The personal development of the insight of the participants into information literacy skills including information-search strategies, as affected by the program, was generally said to have a stimulating effect on their personal interest in information utilization. Some participants shared the following opinion:

> The more you have seen with your own eyes and tried your hand at, the more interesting the process of information utilization has seemed. (F; the same idea expressed in other wordings also by H and J).

Other persons declared:

> The acquired insights into what it's all about and the growing understanding about how to manage your information seeking to meet your needs, makes you feel safer and more fit for fight. (A; the same idea expressed in other wordings also by G and H)

> The door to the library and to a more effective information usage opened and the threshold became lower. In addition I lost some prejudices. (B)

Q reported that after the intensified program he was no longer anxious or frightened because it had been shown that information seeking was not as insuperably difficult as he had thought. B, finally, felt that the program had affected his way of thinking thanks to a thorough reminder of the importance of keeping a watchful eye on education and information of other kinds.

Considering the outcomes of both interventions, it can be concluded that, as regards those participants who reported changes after attending the elementary program, the intensified program brought further changes such as a more profound interest in information utilization. Furthermore, persons B and Q, who did not observe any changes after the first program, reported changes after the second, intensified program. (See, the section Perceived Changes in Attitudes).

As regards the effects in terms of changed attitudes towards the library as an information resource for small industries, six managers out of eight stated changes resulting in a more profound interest. The participants who had not changed their opinion, D and Q, argued that their interest had been aroused already during the elementary program, from an earlier perception of the library as a totally unfamiliar building. Also with respect to the library, the managers generally were of the opinion that, the more they had learnt about this resource, through the instructions and exercises during the program, the more interesting the library had appeared as an information resource to count on to satisfy the needs of small industries. Some quotations from the evaluation interviews illustrate this:

> After having practised how to search for information in the library, I realize that the library is a fantastically interesting resource. (B)

> Before, I didn't know that libraries could be used to such an extent and that you could get such interesting things out of them. Having had the opportunity to see with your own eyes and personally manage the information-seeking process from a request to finally finding a special book on a certain shelf in the library has removed many a question or perhaps even doubt. (G; the same idea expressed in other wordings also by H)

From the evaluation interviews, it is clear that the successful participant-guided organization of the intensified program, with instructions, demonstrations and exercises based on the participants' own perceived needs, facilitated these changes.

A comparison of the outcomes of both interventions shows that participant J had altered his position from a previously stated unchanged view to one indicating enhanced interest.

As regards the effects of changed attitudes towards the university as an information resource for small industries, finally, a picture quite similar to the previous one appears. Six persons out of eight, the same as in the previous case, stated an enhanced interest in the university in terms of being able to meet the information needs of the enterprises, while the remaining two cases reported no change.

Generally, the participants were of the opinion that both programs as a whole had made them aware of the amount of interesting activities and knowledge development going on within the university. Furthermore, they argued that one extremely important outcome of the program was showing that the university really wants close links and contact with small industries.

From the elementary program, participants A and B had shifted from a previous unchanged view to one indicating changes in a positive direction. Q argued that his interest had already been aroused at the first meeting. D stated that no changes had occurred, either after the elementary program or after the intensified program. Here, it can be noted that already during the diagnostic interview he had expressed negative expectations of the role of universities for small firms (Compare with what was said in Chapter 5, the subsections Opinions about Universities, as well as Expectations of the Role of Universities for Small Firms).

In summarizing the presentation of human-processual outcomes with respect to change in attitudes, it is evident that the intensified program was very successful in bringing about positive changes in the participants' attitudes towards information utilization as well as towards the library and the university, respectively, as information resources for small enterprises in particular. The intensified program was perceived as a suitable complement to the elementary program, contributing to a deeper interpretative understanding which was instrumental in altering beliefs and affective states in a positive direction resulting in a greater interest.

Program-Related Outcomes

The evaluation of the intensified intervention program provided measures of program-related outcomes comparable with those in the elementary program (Compare with Section Evaluation of Intervention I, Program-Related Outcomes). These are:

- Assessments of the gain (success) of the program
- Attitudes towards future participation in information programs or workshops in the field of information utilization.

The program-related outcomes with respect to perceived gain are based on a 5-point scale index quite comparable with the one used in the evaluation of the introductory program (compare with the presentation in the section Evaluation of Intervention I, Program-Related Outcomes). Table 29, below, presents the individual values as well as the aggregated values (means) for the four items included.

From Table 29, it appears that also as regards the gain, the intensified program was considered to be fairly satisfactory with most individual values ranging between 3 to 4. So, in comparison, the outcomes of both interventions were, with respect to perceived gain, were very similar (see, the section Evaluation of Intervention I, Program-Related Outcomes).

Table 29. Assessments of the Gain (Success) of the Program. Measures on a 5-Point Scale. 5 = most positive.

Case	Opinion			
	Stimulating element of work	Increased knowledge	Valuable contacts	Tips, material of practical values
A	5	4	3	4
B	3	3	2	3
D	3	5	3	3
F	3	4	4	3
G	4	3	4	3
H	3	4	3	3
J	4	4	3	4
Q	4	3	4	3
Mean	3.63	3.75	3.25	3.25

n = 8

The last program-related outcome to be considered concerns participant attitudes towards future participation in information programs or workshops in the field of information utilization. Data available from an open question during the evaluation interviews indicate solely positive attitudes. All the participants declared that attending the two programs in this project had aroused their interest in learning more about this field of work. Being offered a chance of

continuously keeping abreast with the development of new facilities in the field of information supply was generally stated as a need for urgent attention; this need of information included recurrent reviews of available university and library resources.

Performance Variables

In this subsection, the effects of the intervention are described with respect to individual utilization behaviour and to performance changes at the organizational level.

Variables of two kinds, comparable with those of the outcomes of the introductory program, will be accounted for: effects in terms of perceived behavioural change, and effects in terms of perceived degree of implementation. The values presented are based on the evaluation interviews aimed at measuring the outcomes of Intervention II.

Effects in Terms of Perceived Behavioural Change

The effects dealt with here refer to effects on the performance of the information utilization process. The effects of the intensified program on the process of information utilization were comparable with the evaluation of Intervention I, measured through assessments of the participants' own self-development.

Five participants out of eight noted behavioural changes with respect to information utilization after attending the intensified program at Linköping University. Compared with the outcomes of the elementary program, this result indicates changes in a positive direction. This means that persons stating no behavioural changes after attending the first program (F, G and Q) reported changes after the intensified program and also that some persons perceiving changes already after the first phase reported further changes after the second phase (A and J). The remaining cases, B, D and H, did not report any behavioural changes on either of the occasions.

In line with the evaluation of the introductory program, interviewee ratings of effects in terms of time devoted to information utilization activities (compare with the presentation in Chapter 9, Effects in Terms of Perceived Behavioural Change) are also available. Only one person, J, was of the opinion that the time he devoted to information seeking and utilization had increased as a direct result of the intensified program. He argued that his increased information-seeking ability had contributed to information utilization becoming a more essential part of his practical work than before. All the other participants stated that no changes had occurred since the diagnostic interviews. Consequently, taking both interventions into consideration, neither the elementary nor the intensified program was successful in bringing about changes in this respect, except in a few individual cases. Changes could, however, occur in the future.

As a reason for the low degree of behavioural changes in this respect, however, the interviewees generally called attention to the fact that contextual circumstances limited the degree of freedom to act; reality in the form of a depressed industrial climate was still there as an important determinant of organizational activities. Thus, in line with the antecedent findings indicating the significance of environmental conditions for organizational and individual ability to take action, these influences appear to be crucial determinants of the process of implementation as well (compare with the presentation of antecedent findings in Chapters 5, 6 and 7).

Effects in Terms of Perceived Degree of Implementation

As in the presentation of the outcomes of the introductory program, the effects of the intensified program in terms of perceived degree of implementation are of two kinds. The first measure refers to the extent to which resources, which the participants were informed of and shown during the intervention program, were put to practical use. The second measure refers to performance outcomes at the organizational level. The outcomes dealt with here were measured in exactly the same way as were the outcomes of the introductory program (see Chapter 9, Perceived Changes in Attitudes). Table 30 shows the perceived degree of implementation from interest shown to practical use of resources.

As regards the participant ratings of the extent to which the resources were put to practical use, a discrepancy between interest shown and practical use can be seen: the measures obtained according to Table 30 indicate variations in terms of the degree of adoption between different resources as well as individual differences. The resources most adopted were the university library resources including printed bibliographies and the resources of other university departments in the field of technology.

To promote an understanding of the adoption process, the results of interven-tion II as shown in Table 30 will be compared with the outcomes of the introductory program (See, Perceived Changes in Attitudes). In the text below, these data are described taking the individual values into consideration. In the case of the library resources, all the participants had, at the least, decided to use the resources after attending the intensified program. The assessments of person J indicate that his degree of adoption changed, from the first program to the second, from interest shown to practical use of the library resources in general as well as of printed bibliographies and the like. He had begun contiuously using Linköping University Library and the public library in the town where he lives. All the other managers stated the same degree of implementation as after attending the first program. With respect to the use of library journal collections, the values indicate changes in the way that J had begun using this resource from an earlier stated interest. Finally, B and Q showed an interest in using the library journal collections compared with the statements of no current interest after Intervention I.

Table 30. Perceived Degree of Implementation from no Interest to Practical Use of Resources.

Resource	No current interest	Would like to use	Have decided to use	Have already begun using
University library	-	-	B, C, F, G, H, Q	A, J
Printed bibliographies	-	-	B, D, F, G, H, Q	A, J
Journals	-	B, H, Q	F, G	A, D, J
Databases on-line	-	D, H	A, B, F, G, J	Q
University	-	-	A, D, J, Q	B, F, G, H

n = 8

Consequently, it can be concluded that the changes found were all differences in a favourable direction.

With respect to on-line information retrieval in databases, the cases D, H, A and B did not state any changes except those at the time of evaluation after the introductory program. The remaining participants all reported changes in a positive direction; from only having shown interest, Q had begun using certain databases, while F, G and J had changed from interest shown to a decision to use.

In the case of the university resources (with the exception of the library), finally, participants A and Q had changed from a stated interest at the time of evaluation of the introductory program to a decision to use the resources. All other cases showed equal values.

In summary, all changes between the introductory and the intensified intervention program were of a positive character, indicating a higher level of adoption after attending the second program.

As regards the second kind of degree of implementation, the extent to which behavioural, technological or structural changes were found in the enterprises studied, the participants' self-ratings on this issue shows, that mainly the participants in the intensified program reported on outcomes of the program in terms of behavioural, technological or structural changes in their companies.
The values of the cases F, H, J and Q indicate changes compared with the outcomes of Intervention I; at the time of evaluation of the elementary program, none of these cases reported any changes: For the cases A and G, the results indicate further changes in addition to those from the first program. The persons B and D, however, did not report any kind of adoption in their enterprises, either after the first or the second program.

In brief, the measures indicate that with respect to adoption in the enterprises, the intensified program was fairly successful. This assessment is

also valid for the two interventions as a whole (compare with Effects in Terms of Perceived Degree of Implementation); altogether, behavioural, technological or structural changes were found in ten companies out of seventeen with representatives attending only the first or both program(s).

Chapter 10

From the Mid 1980's to 1998

Data on the companies from the mid-1980s to the autumn of 1998 were collected in two different ways. First of all, an analysis was made of the extent of survival as opposed to failure and death among the companies. These data are presented in Table 31.

Table 31. Distribution of Companies 1998: Surviving, Reconstructed and Failed.

Unit of analysis	Trade	Surviving	Reconstructed	Failed
Group 1	W	D		A, B, C, K
	M	F, H, L	I	E, G, J
Group 2	W	N, T	O	M
	M	P, Q, R	S	U, V, X

n = 23

Table 31 shows that nine out of twenty-three companies have survived since the 1980's without reconstruction. Further, another three companies have been reconstructed and are healthy today. All three have new owners. Finally, no less than eleven companies do not exist any longer. All the failed companies were liquidated after bankruptcy except G, which was sold to and closed down by a foreign (Finnish) competitor in the early 1990s. These figures reflect the vulnerability of the small firms included in this study.

After this analysis, six companies were chosen for a follow-up study based on interviews with the managers. (For the interview form, see Appendix 3.) This study will be presented in the next section. The stories are presented one by one and then analysed and summarized in categories. Finally, in order to arrive at an understanding of the managers' situation the findings will be further generalized and conclusions drawn.

Stories of Six Small-Company Managers

This section is based on interviews with six managers of the companies D, F, I, O, Q and T. I have fictitiously called the managers Per, Anders, John, Bengt, Lars and Tore. The interviews were held in October - November, 1998, to provide the managers' reflections on past, present and future orientations. The managers communicated their experiences and thoughts verbally to me.

Manager D (Per)

Invited to the small wood-manufacturing industry, I meet father (Carl) and son (Per). The father, my former informant, is now 82 years old, but still going strong. He is still active in the company but his son has now taken over. The narrative below is mainly based on the views of the son.

The products manufactured by the company are very much the same as in the 1980s (interior fittings for shops, show-cases for exhibiting goods, etc.). However, the production processes are different, mainly as a result of technological developments (automation, CAD-CAM, computerized numerical control (CNC), etc.). There are also differences with respect to materials. Nowadays, more "plates" are used instead of real wood. According to my informants, the last ten years have been very important as regards implementation of new technology and new materials in the field of wood manufacturing.

Turning to perceived environmental dimensions, times have been hard ever since the 1980's and still are very tough. In the informant's opinion, market conditions have not offered and are still not offering growth opportunities or opportunities for product innovations. Especially the years 1990 and 1991 were abysmal. The number of employees has halved since 1985, from twenty-two to eleven persons. But, technological improvements (new techniques, automation, etc.) in the production lines have made 80% of the sales in 1985 possible.

The main goal has been to survive and owing to the good financial situation of the company, which means not being in debt, it has been able to survive. The company is, however, not operating at a profit. The business is said to be more symbolic - a number of persons are given work.

Societal demands, including taxation, are still a burden. The government and other national policy makers are said to take the perspective of large companies when dealing with the small-company sector. In different ways, they show a lack of insight into the specific situation of small companies.

On the whole, the environment is said to be rather hostile. Competitive conditions are getting tougher and the company's competitive position is worsening. The competition from eastern Europe in particular is said to be a problem due to the large difference in wages (only 10% compared to Sweden).

When our dialogue turns to internationalization, Sweden's membership of the EU is said to simplify the export of products. In Per's view, however, small-firm managers, including himself, are bad at searching for and exploiting the opportunities. It is bothersome - it is too much. The information explosion resulting in information overload was a problem as long ago as in the 1980s but is worse today, causing psychological phenomena such as passivity and non-use.

Per says he really needs to learn strategies for locating, evaluating and choosing relevant information. He has a university degree in civil engineering but has very meagre skills in computer science as well as knowing little about how to search for information and cannot remember that information literacy courses were offered at all. Training in information skills was not a distinct part of the curriculum and practically no time was spent in the university library. At

that time, he did not realize the importance of these skills, either to course work or to work in the future.. Today, it is obvious to him how crucial it is to have effective strategies in information searching in order to solve problems and manage change. He argues that the school has failed in that respect.

There is a computer in the office, but I am told that it is only used as a typewriter (for letters, etc.). He has a connection to the Internet at home but not at work and claims that he is not familiar with this resource or the technology. Manuals are not supposed to be user-friendly and he has failed to put his personal site on the Net. On the whole, he feels that information technology has not been very useful for the company so far and he does not think an intranet would be of much use for the small company. Per considers, once again, that his computer and information literacy is insufficient and that of the company even poorer. The production management team is in great need of learning about available information resources and how to gain access to, evaluate and use relevant information. When I mention the resources and the pedagogical role of Linköping university library and ask if he would like to attend an information literacy seminar including demonstrations, he happily accepts the invitation.

Finally, looking into the future, Per points to the fact that he has had to concentrate mainly on the day-to-day business without any opportunity to think strategically and that he cannot see the possibility of taking the time to plan for the future. Lack of time is a crucial barrier; you have to use all your energy to be able to solve the urgent problems of today. His view of the future is rather pessimistic. He notes that all possible cutbacks (for example, in the office) have been made in order to survive, which means that as the manager, he is even more restricted and stuck in the day-to-day work. He is also very pessimistic about the future of the Swedish manufacturing industry as a consequence of increasing competition from the low-salary countries; you cannot compete on even terms. Criticising social policies and the labour market, he points out that computers are not an option for everyone; information technology is not the only solution to the problems faced by small companies.

Manager F (Anders)

Anders, the manager of a small mechanical engineering company, takes me to his office to give his story.

As an introduction, he says that large changes have occurred since the 1980s, mainly reflected by changes in social dynamics. The most important change relates to market conditions: The company now has a larger share of the export market. The internationalization of trade has presented new opportunities and the company has been very successful in adapting to the new context of internationalization of the economy. Exports now account for half of all sales compared with the very small share in the 1980s, and growth on the foreign market is steadily increasing.

So Anders sees nothing but opportunities for strengthening the company's foreign-market position. In his view, we are now entering a global economy and

Sweden's EU membership will have a positive influence on market incentives and the perceived opportunities of competing internationally. The prevailing uncertainty concerning Sweden's relationship with the European Monetary Union remains however a problem. On the whole, the company, now employing 47 persons, is characterized by stability and robust health as a consequence of good profits.

Anders points out, that the world has shrunk in the sense that telecommunications and information technology are breaking down the borders. There is a need for a global perspective since the Swedish market is too small.

Information technology is regarded as a strategic resource for industrial work and for keeping up with environmental changes from a global perspective in order to make competitive advances. Some applications of information technology are already being utilized in the company, but there will be further implementation in the near future.

The company has a client-server platform mainly for word processing, calculations, CAD-CAM, etc. as well as machines controlled by computerized numerical control (CNC). In addition, the company is connected to the Internet has a site on the Web (created and continuously updated by a consulting company). But according to Anders, customers very seldom surf on the net for product information. He also says that so far, the Internet has not been of much use for finding new contacts. He is, however, sure that this will change in the near future. Orders and construction drawings are usually sent by telefax (earlier by telex). Documents are not yet delivered electronically via the Internet or on diskettes, but changes are certainly on the way. He can also see the possible implementation of an intranet in the future.

However, the Internet is a fairly new resource for him and most of the employees in the company and he says that improving computer literacy is urgently needed. Courses have been given in CAD-CAM, etc., but a general improvement is needed, which includes basic information and communication technology skills, to be able to exploit and be aware of their potential for promoting an effective use of information technology in industrial operations. To encourage the acquisition of the basic knowledge required, the employees have been offered computers to take home and, hopefully, this will lead to some spin-off effects.

Anders also stresses the need for access to relevant information in order to keep abreast with environmental dynamics as to fluctuating market conditions, finding new customers, etc. He finds searching for information extremely difficult from a global perspective and realizes that there is a need for effective strategies for searching, knowledge of available information resources and knowledge of patents as information resources. How to search for relevant information in a strategic way, how to evaluate what you have found and how to organize it in a suitable way for easy use is the difficulty, rather than the ever-increasing flow of information per se. Replying to my question of whether he would like to attend an information literacy seminar focusing on these topics, he says that he would be only too willing to come.

Finally, commenting on his prospects for the future, Anders thinks that information technology will have an enormous impact on industrial operations; there will be far-reaching effects on production structures and methods. He also believes that new information technology applications will spread to and generally be used by employees and workers at all organizational levels; we are only at the beginning of a process that will transform our working conditions.

He also emphasizes how very important it is to maintain a high level of education in society in order to promote growth, competitiveness and employment. There is a risk that the competitive position cannot be strengthened if the necessary resources are not reserved for higher education, especially engineering. Today, it is sometimes difficult to find people with appropriate qualifications. Universities have a vital role to play in preparing students for future work.

Manager I (John)

I meet John, the manager of a small mechanical engineering company, at his office and he takes me to the conference-room for our dialogue about the company.

Looking back, John tells me that after a number of tough years, the company went into liquidation in 1991 after which he took it over. But he had directly or indirectly been involved in the company's business for years before the taking over. After working as an engineer at Electrolux and Stal Laval, he started a firm of consulting engineers in 1974. He produced construction drawings for Tetra Pac which, in turn, used the small mechanical engineering company as a subcontractor. He has been the sole owner of the company for the last eight years.

70% of production is based on subcontracting for other companies (such as Tetra Pac). Being a subcontractor involves design and product development as well as production for larger companies. However, the company also has its own products such as dishwashers for the foodstuff and medical industries. The company has an in-house development department with ten designers.

The company is very successful with 100 employees and total sales of SEK 100 million and it is steadily expanding and strengthening its position in foreign markets.

The company's good financial position has made important technological investments possible in recent years: SEK 10 million, which includes SEK 6 million in new information technology including techniques and applications. Environmental dynamism, including above all increasing competition, has resulted in new demands on the industry to effectivize and reduce production and administrative costs. John stresses that the main goal of the huge technology investments is to gain a competitive advantage and to improve the ability of the company to survive crises. Information technology is said to be a key ingredient for proactive innovative strategies and success.

In January, 1997, the industry suffered a slump and four employees had to be laid off. But with business improving again, three new persons were employed in April, 1997. However, these new employees had different skills and expertise compared with the employees laid off earlier that year. The implementation of new technology has brought with it new and more complex processes and has also led to developments of the industrial organization; the hierarchical structure has been flattened. The intention is to transfer the greater part of the work from the administrative staff to the workers themselves. This means that the employees working in production will program the new computer systems to perform the necessary tasks in production. Earlier, this had been the responsibility of the office staff. John points out that these new industrial processes obviously severely test the competence of the employees. He also stresses how very difficult it is to find and employ people with the necessary skills. In his view, this will result in a large scale cultural development of work leading to changes in the nature of work and the organization of production.

John takes me for a walk along the production lines. Automation and computerization are well developed, but new machines have just arrived to be set up. John says that in his view, they are one of the few companies that do not use any paper-based drawings at all. If paper-based orders and construction drawings are sent by post or fax to the company, they are scanned into the computer system. I am told that every team of workers has orders, drawings and other necessary documents electronically available on-line. The very latest technology is apparently utilized in company's industrial operations and its administration; a fully integrated system, Intentia Movex, is used for orders, production, marketing, sales and so on. There is also a small department for marketing and information in the company which is responsible for the layout and production of printed matter about products, etc. using the latest information technology (Macintosh-platform, using programs such as Photoshop, etc.).

The company has a systems manager responsible for the implementation and operation of information technology in the company. At the moment, he is very busy with the implementation of a WWW server, which should be installed by January, 1999. The company already has a site on the Web, but decisions have been made for further development of this site.

A sign of the importance attached to information technology is the fact that all employees have been given an offer to buy a computer of their own to use at home. John stresses that his philosophy is that this offer will result in spin-off effects which will further the development of the company. Becoming more acquainted with the new technology is very important. John stresses that the offer consists of a whole package including a course, a so-called computer driving licence; for motivational reasons, the company reimburses the employees costs after they have passed the course. Most employees have accepted this offer. In this connection, I am also told that you cannot buy knowledge - you have to work for it yourself!

John also stresses that the company prioritizes education and training. The employees have been given training in how to use the company's new computer systems (including computerized numerical control, CNC) as well in marketing,

etc. Internal seminars about market conditions and the company's competitive situation are also held regularly. People from every area of work are also regularly sent to external seminars and exhibitions to keep up with developments in the field. As to information literacy, John points to the fact that implementation of the Internet and an intranet has just started in the company and, of course, there is a need to know more about how these resources can be used more effectively and to brush up one's skills in information searching. He looks forwards to a seminar on this topic at the Linköping University Library.

Once again John stresses that technological developments combined with the competitiveness and growing internationalization of the industry have given rise to new and more demanding requirements as regards knowledge and skills in industrial work. In his view, the most difficult thing is to find the right employees with the right competence (including engineers, welders and experts in other fields). It is John's opinion, that society has failed in respect of vocational education tailored to the requirements of small up-to-date industries. The lack of qualified employees, he says, is a crucial barrier, so serious that orders have to be turned down. The most important industrial factor is having appropriately qualified employees.

John stresses, that there is an increasing need for further links to universities and establishing contacts with students. Some students have made their examination project in the company. One in particular was very important to the development work being done in the company; it was about the electronic control of construction drawings and the advantages of this process, a process needing much attention for implementation in the industry.

As regards national policy, John points to the fact that both the Government and the politicians think that information technology is the only solution to the development of small companies and forget the country's base industries and their needs. He says he has a genuine interest in technology, and information technology in particular, and can see the potential. But in his view, it is all too exaggerated. It cannot only be a question of information technology and high tech companies.

Manager O (Bengt)

I meet Bengt, the manager of a small wood manufacturing industry, and we talk in his office.

He says that a lot has happened since the 1980s. The company has been reconstructed. Bengt is the son of my former informant. He was employed as early as in 1984 when his father was manager. The company was sold in 1989 and after a few tough years it went into liquidation. After that, Bengt and six other employees were able to buy the company with the support of the municipality.

The products manufactured today are similar to those manufactured in the 1980s, furniture. Bengt stresses, however, that the final products are not

produced as unities any longer but in separate parts or components according to the skills profile of the company. The production processes are different today, thanks to technological developments including automation. Computer-based processes (including CNC-controlled milling machinery) are said to be a necessity for survival nowadays. According to Bengt, in this respect, the engineering industry was comparable earlier with the forest-based industry, but much has happened in the 1990s. Today, there is need for machinery of a quite different kind (above all, easily modifiable) due to shorter series. Time has shrunk and just in time production is a strategy for cutting stock costs. Bengt is sure that the limit of what is possible has been reached in this respect. Total sales have doubled (from SEK 6 to 12 million) with the same people involved since the mid-1980s.

Times have been hard as a result of shrinking demand for the company's products and falling prices caused by the contraction of the building construction market. The perceived environmental climate is thus very tough and profitability too low with too narrow margins. Bengt says that the company's weak position is also the result of an increasingly complex legal, fiscal and administrative environment. But there are positive dimensions as well. The company has expanded in foreign markets from having mostly concentrated in the domestic market in the 1980s. Exports (to Europe, Turkey, Japan) now account for 65% of the total sales volume.

Turning to internationalization, Bengt talks the rapidly emerging globalization of the economy and its consequences for small-business strategies. The Swedish membership of the EU, he says, will increase market dynamism and offer new opportunities. But, you have to be properly equipped. New knowledge and skills are required in order to meet new demands. Skills in foreign languages, for example, are absolutely necessary to be able to operate in international markets. There is also a need for intercultural communication skills. But as a subcontractor, you are linked to large enterprises and are usually helped to enter new markets and become accustomed to different cultures.

Bengt stresses that today, we are living in a quite different society, a global information society which makes great demands on managers of small companies and industrial operations. There is an increasing number of courses, projects and EU subsidies available as well as a continuously growing information flow. In Bengt's view, the crucial problem today is how to search strategically for relevant information to discover what is happening, to check if you are on the right path or to solve concrete problems and to evaluate and organize the information obtained. Bengt stresses that there are no tools available for this. He also notes how extremely difficult it is to find the time necessary for such tasks. As a manager of a small company, you have to concentrate on today's work and finding solutions to urgent problems.

Information technology is a fairly recent phenomenon in the company. Bengt says that in the mid-1980s, at the time of my last visit, there was not even a fax in the office and nobody had thought of introducing a computer. But, much has happened since then and further changes are on the way. CAD-CAM is a necessity and nowadays, computers are also used for invoicing and accounting,

but not yet for the handling of orders, stocks and the like. The fax was the dominating method of communication up to 1989. Today, it still remains an important tool, but electronic mail is coming. Bengt says that even if it is possible to simply send an attachment by E-mail all orders are still sent by fax. A few years ago, however, the original order was sent by post as well, for security reasons. As to the possible usefulness of an intranet, Bengt feels that the company is too small. He can also see the risk of communication between people being neglected. It is a question of using the right technology for the right things.

Bengt notes that his computer literacy is very restricted. He says he was not brought up with information technology like the youngsters of today and refers to how differently his own children deal with computers. He is an autodidact, but is interested in attending courses.

Lack of information literacy skills is still said to be a crucial barrier. In Bengt's view, he has not been searching information in a structured and strategic way and suffers from not having the knowledge of available information resources as well as of how and where to find relevant information. You have to keep up with a constantly growing information flow in the information society to be able to meet new market demands, etc. Information literacy, including computer literacy, he says, is the key skill he is in urgent need of; knowing how to search for, evaluate and find relevant sources of information using information technology. But he has not seen such courses being offered and does not know who could give them. When I tell him about the information literacy courses given by the Linköping University Library and ask if he would like to attend such a course, he says that he really looks forward to doing so. I' am told that the only use he has had of the university is a survey of energy use carried out in the company as an examination project. Hopefully, the the results of the examination project can be implemented, but it is a matter of finding the financial resources necessary.

Finally, looking into the future, Bengt's prospects are fairly positive. In his opinion, there is a pent-up demand in the construction market; sooner or later it will explode and the demand for the company's products is very much connected to this market. (Nowadays, young people live with their parents until they are almost 25-30 years old. If they bought a house and home of their own instead, they would need furniture.) But Bengt also stresses that you can never know because of continuously changing social, political and economic conditions. He refers to the situation in 1992, during business depression, when the furniture industries in Tibro decreased from 150 to 50; nobody dares invest in times like that because of the psychology involved.

The competition, especially from eastern Europe, is crucial, says Bengt. You cannot talk about Swedish quality any more due to the fact that, everything is about money nowadays compared with the 1980s. Everything is much more vulnerable today, but our strength is in-time delivery of products. Bengt is sure, that new technology and information technology in particular will be very important to the competitiveness and economic development of small companies.

Manager Q (Lars)

I meet Lars at the Linköping University Library (the Humanities and Social Sciences Library) for a talk.

Lars says that a lot has happened since we met in the mid-1980s. At that time, he was the sales manager of the small mechanical engineering industry (Q) producing oil-heating products, oil-burners in particular. Competition in the trade had been relatively low, but in a short period of time environmental changes, in terms of rising oil-prices combined with technological innovations (not oil-based) introduced onto the market, caused instability and a lot of uncertainty. Besides, owing to the fact that companies are bought and sold, another company entered the market with new complementary products for survival. But cutbacks had to be made and the company was in such a precarious position that he decided to leave when he was offered a comparable job by a company in 1986. His work in the new company was similar to the work he had been doing in his old company. In the beginning of 1998, the company was sold first to a Swedish buyer and later that year to an international (Dutch) group. As a result of this, the company's concept changed from supplying details to supplying complete packages of products, including everything for bathrooms. In Lars' view, this is a competitive strength.

At the moment, the company is owned by a Dutch group (Maastricht) and, according to Lars, this fact has led to his being aware of what the nature of internationalization is all about. Lars stresses, that he cannot imagine national borders any longer; Sweden belongs to the European Union and you cannot have fences enclosing the nation. He really looks forward to the Euro and the single monetary market. At home means Europe. Nowadays, world-wide exports account for 50% of the total sales volume.

Lars stresses, that being an player on the international stage means that there is need for knowledge of foreign languages. He is fluent in English, but in his view, many managers of small companies do not have the necessary knowledge, especially of expert terminology.

According to Lars, his personal information utilization leaves much to be desired and so does that of the company. Rather than go to formal sources of information needed for decision making, etc., they mainly rely on informal contacts with other people. Lars says that he prefers working with other people; you talk to people to hear what is going on. The fact that there is too much information is causing increasing distress and exhaustion; there is too much to care. In addition, Lars feels that he suffers from not knowing how to find and use formal information effectively.

Lars stresses, that he is not a master of information technology applications. He has a portable PC for registering customers, etc., but is still using his old card-index. He has also been offered the opportunity of buying a personal computer through the company to use at home. But, what use can it be to him? He explains that he does not understand how to use it.
Accordingly, he feels he has all technical equipment necessary, but suffers from a lack of computer literacy skills necessary for using it effectively. Lars says

that his knowledge is so restricted that he is afraid of attending a course and showing how little he knows. He also argues that to become an effective user you must practice frequently. As a matter of fact, deep down inside, he is unwilling to use new information technology because nobody has explained the usefulness of it and how to use it. Computers are not known for being very user-friendly and his view of the matter is that there are a lot of barriers involved when using them, everything from reading manuals, interpreting of icons, etc. Computers require too much of the users. And, above all, he cannot allow himself to take the costly time necessary for it. So, the PC is just a very expensive typewriter. But, if someone asks, he can at least say that he has one, even if it is not much use.

Even if Lars feels unwilling to use information technology today, he is quite sure that he has no choice. Information technology has come to stay and in the near future it will be absolutely necessary to use it in order to maintain a competitive edge. So information technology is both an opportunity and a threat to him. On the one hand, he is sure IT has potential, but he does not know what that potential could be; on the other, he does not have the time to think strategically in order to take advantage of this potential. one is too tided up in today's work.

Manager T (Tore)

I meet Tore, the manager of an industry of prefabricated houses, in his office and he takes me for a walk along the production lines telling his story. The premises have been extended since we met in the 1980s and the office has moved to a new building.

Tore says that times have been extremely tough and threatening since the late 1980s. The demand for the company's products has dropped from 25 000 houses/year in the 1980's to approximately 3 000 today. Tore stresses, that in the 1990s the Swedish construction market has been practically erased from a previously very strong position. The fact that the environment has changed very rapidly and that these changes have been very difficult to predict, has placed heavy strategic demands on the company. In Tore's view, it is a miracle that the industry still exists; it is against all the odds.

According to Tore, national policies towards and incentives for companies and entrepreneurship have changed through the years; from being looked upon as a criminal in the 1970s, as half-criminal in the 1980s and, finally, to almost acceptance in the 1990s. However, society's demands, including taxation, labour market legislation and politics, are still heavy burdens. In Tore's view, the situation is so bad that if he had to start up once again, he would not do so.

To cope with the hostility in terms of the shrinking market and low profitability with too narrow margins. etc., internal and external adjustments had to be made.
Internal adjustment refers to intraorganizational responses in terms of changes in administrative practices and approaches, structure, etc. to enhance the

company's efficiency and effectiveness. In the 1980s the company had 50 employees and in the early 1990s 60-70 employees. Today, the number of employees has dropped to 45. The growing competition has resulted new demands to effectivize and reduce the cost of all industrial processes as well as administration. The office staff has been reduced by 6 persons, including building-construction engineers, architects and the sales manager for the German market. In addition, seasonal notice is given to the employees.

External adjustment refers to offensive strategies taken to deal with unfavourable market conditions. In the late 1980s, Tore became aware of the impossibility of surviving with the company focusing on the shrinking domestic market, mainly as a result of political and economic changes in society. Accordingly, steps were taken to find new markets to enter and especially to strengthen the company's position on foreign markets. The only chance of surviving was to innovate and adapt to the rapidly changing environment; you had to take the risk.

At the time of the fall of the Berlin wall, a decision was taken to introduce so-called volume-houses (here, this refers to turnkey houses) above all onto the German market. Plans for this introduction were completed in 1992 and in 1993 or 1994 the domestic market practically collapsed. They were successful and in a few years their survival depended on the German market. Little by little, they have also tried to enter the Danish and Norwegian markets, but there are difficulties in offering competitive prices. In Norway, they have also faced other difficulties in the form of a new building law and building regulations. This has had a negative effect on Norwegian prefabricated house-industries. So, in Tore's view, they have more or less failed to gain a foothold in the Nordic markets.

Exports now account for 90% of the total sales volume, indicating a situation quite the reverse of that in the 1980s. These adjustments to the market pressures constitute a strength per se, indicating that the company has chosen an appropriate strategy. But according to Tore, the position of the firm is still very weak. Orders, corresponding to the year's sales, make up the basis for the future enterprise.

The European market, he says, has great potential, even if there are some irritating administrative troubles and difficulties needing a solution. The exchange rate is a problem. In Tore's view, building a house is nothing compared with having to deal with these types of problems. Sometimes, you can almost talk about commercial blockades.

Information technology is a strategic resource for industrial work. Tore stresses, however, that you must keep a distance to it and use it for what it is suitable for. Furthermore, it is only a part of the whole company. The question is what you can save by using information-technology applications compared with traditional solutions, for example, paper-based administrative routines.

Some information-technology applications are already being used in the industrial operation and the administration (Auto Cad, Word, Excel, Lotus Notes, etc.), but decisions have been taken to increase this. As a matter of fact, a detailed examination of the company's requirements should be carried out as a

basis for future investments. Tore realizes that in the near future, every salesman, wherever he is in the world, should be able to go on-line when he needs to check matters prices, orders and anything else necessary. An expert should be employed to implement a new system including Internet and intranet solutions. The industry already has a site on the Internet for international marketing of products and, in Tore's view, this resource has only just begun to be used. In the near future, when the market has matured in the field of information technology, the Internet could be an important tool for communication and marketing.

Tore stresses that the company has made large investments in training and educating all its employees over the last ten years. The industry now has an ISO 9001 certificate and the products are SP-marked. The investments in information technology already decided on will lead to the need for enhancing computer literacy skills. As to information literacy, Tore notes that the company's market niche is very small and that you depend mainly on your own personal network, including the bank as well as professional advisors from the trade associations and the Export Council for your know-how when making entrepreneurial decisions. Usually you do not go out searching strategically for information. So competence needs to be enhanced. But, according to Tore, everything has a price. Above all, time is very expensive and you always have to ask yourself if the anticipated results justify the expense. When it really matters, you cannot take the time to attend courses instead of solving urgent problems in the business.

Lack of available capital and time are two serious restrictions on future development. On the whole, Tore's forecast of what the future could bring about are not very optimistic. Wrestling with urgent capital problems, his main goal now is to survive.

Interpretations

The six narratives presented above gave the managers' view of the development of their respective companies from a societal perspective. I will now interpret the different meanings that were present in these narratives. The managers' meanings will be summarized in the form specific categories of thoughts. The managers' reflections will be exemplified by means of quotations. Finally, I will draw a number of conclusions.

Balancing on a Tight-Rope

The first general emerging from the six narratives is a picture of an increasingly tough competitive climate in society. Large changes have occurred since the 1980s, mainly reflected by changes in societal dynamics. Times have been hard and threatening and market conditions have not offered opportunities for growth

and innovation. The economic climate, it is said, does not provide the necessary market incentives and make capital available. Profitability has usually been low. With a few exceptions, the companies have been balancing between survival or failure. For most of the companies, the goal has been and still is to survive and four out of six have survived. The exceptions, the mechanical engineering industry I and the wood industry O, were reconstructed in the early 1990s and are healthy today. The hostile societal climate is also reflected in the total failure rate among the companies included in this study (see, Chapter 10, Table 31). The market conditions have been particularly unfavourable for the companies in the construction industry, indicated by the fact that the domestic market has not only contracted but almost disappeared since the early 1990s. Internal as well as external adjustments have been necessary to deal with the hostility. In some cases (the companies D and T), the number of employees has been halved. The only chance of surviving has been to innovate and adapt to the rapidly changing environment.

It is also clear, that societal demands, including taxation, legislation, policies, complexity of regulations and pressure of obligations, etc., have remained a burden since the 1980s. Furthermore, the norms and values in society are still not considered to be very positive as regards entrepreneurs and entrepreneurship, even if there has been a change for the better. As manager T (Tore) puts it:

> As an entrepreneur, you were looked upon as a criminal in the 70s, as half a criminal in the 80s and, now, in the late 90s you are almost house-trained.

Furthermore, compared with the 1980s, the government and other policy makers are still said to show a lack of insight into the specific situation of small companies. They apply the perspective of large companies when dealing with small companies. So, to lighten this burden, what is needed is a radical change in attitudes as well as a transparent, stable and predictable regulatory framework.

Internationalization - the New Context of Economy

Another general trend since the 1980s is the rapidly emerging globalization of the national economy with consequences for the strategies of small companies. Swedish membership of the European Union in 1996 is said to contribute strongly to the internationalization of the Swedish economy and increase market dynamism, offering challenges and new opportunities. The managers all agree that Sweden should also join the monetary union as soon as possible, thus removing the inconvenience of working with two currencies at the same time. The foreign exchange rate is a problem.

On the whole, the managers' narratives show that all the companies are more internationally oriented today than in the mid-1980s. Most of them have strengthened their position on foreign markets instead of concentrating on the domestic market, as was the case in the 1980s. The Swedish market is said to be

too small. Some companies have been successful in adapting to the new context of internationalization. As a matter of fact, for one company, T, strengthening its position on foreign markets is said to have been the key factor in its ability to survive.

However, environmental dynamism, including above all increasingly tough competition, has resulted in new demands on the companies to reduce the cost of all their industrial processes. The wood-industries in particular regard the competition from eastern Europe as crucial. Everything is said to be more vulnerable today.

Facing the Information Age - the Importance of IT

It was the managers' general opinion that compared with the 1980s, we are now living in a quite different society, a global information society with large demands being made on industrial work and managers of small companies. The information age is a reality.

As early as in the 1980s the information explosion resulting in an information overload was a problem, but it is that much worse today causing psychological phenomena such as to passivity and non-use. It's too much trouble, it's too much and you can't handle it. (D)

Mainly, information technology is considered to be a strategic resource for industrial work and for keeping up with environmental changes from a global perspective in order to achieve a competitive advantage. Telecommunications and information technology are bringing down the borders of the global market.

For most managers, information technology is, however, a fairly new phenomenon and their computer literacy, they say, is limited. They are mainly autodidacts and relatively unprepared to deal with the challenges of new information technology equipment. From the narratives it is clear that the managers show different degrees of technological maturity, from pursuing a wait-and-see policy or showing an interest to a situation where they are ready to use or are already using information technology applications.

Most managers can be placed in the wait-and-see group. They point to the fact that they are not fully aware of the potential and usefulness of information technology in industrial operations and the computer is mainly used only as a typewriter except for CAD-CAM and computerized numerical control.

One manager in particular, John in company I, can illustrate the latter group. The reconstruction of the company required serious rethinking about how business should be conducted. For him, information technology is a key ingredient of proactive, innovative strategies and success. His strategy is to make major investments in technology in order to gain a competitive advantage and improve the company's odds of surviving. He shows proactiveness in coping with information technology solutions. His idea is the total abolition of paper-based routines. Orders and drawings are only available electronically on-line through the production lines, from orders to production and marketing of

products. In summary, the implementation of new technology has caused a change the nature of work and the organization of production. It is contributing to the disappearance of routine and repetitive work. According to John, this represents a large-scale cultural trend.

A sign of the importance attached to information technology is the fact that a few managers have given their employees an advantageous offer to buy a computer to use at home in order to become better acquainted with the new technology. They stressed that this could lead to spin-off effects, which would promote the industrial operations and the competitiveness of the companies.

The managers' generally positive opinions of information technology were not, however, without reservations. Criticising societal politics and policies for their limited vision, the managers stressed that information technology cannot be the only solution to the problems small companies are facing. According to John (manager of company I):

> Everything is too exaggerated. It can't only be a question of information technology and high tech firms forgetting the national base industries and their needs.

New Demands in Knowledge and Skills

Technological advances combined with competition and growing internationalization have given rise to new demands on knowledge and skill for industrial work; the challenges of the information age call for an emphasis on new skills. You have to be equipped with the necessary knowledge and skills to be able to adapt quickly to new demands and changes. According to the managers' narrative, the new work processes resulting from technological advances and internationalization severely test the competence of the managers and the employees.

It was the managers' opinion, that it is the responsibility of society to create the necessary prerequisites of survival for modern small industrial companies and entrepreneurship. For example, John, the manager of company I, stresses that society has failed with respect to vocational education tailored to the requirements of small, modern companies. Finding employees with the appropriate competence is said to be a crucial barrier today, so serious that orders have to be turned down. The education system should prepare the pupils and students for future work and entrepreneurship. In the managers' view, it is necessary to prioritize quality in education to strengthen the competitiveness of small companies. The general level of skills has to be improved, but some key skills are stressed as being crucial: Technical knowledge (civil engineering), communication skills, including foreign languages and intercultural communication, and basic training in information technology. The importance of reintroducing the apprenticeship system as an alternative to the general vocational education is also stressed. Swedish membership of the European Union

means that competence and craftsmanship will become a more important factor in competitiveness of industries and services.

In an age characterized by rapid change, a global economic environment and a constantly increasing supply of information, it is increasingly necessary to be informed and up-to-date. Every decision and step taken should be based on a relevant knowledge base. The managers generally find information searching extremely difficult from a global perspective and realize that there is a great need for effective search strategies utilizing new information technology. Accordingly, it is not only a question of physical access to new technologies, but also a question of how to use them. It is clear that most managers do not know how to find and use information effectively and seem to be in urgent need of computer literacy as well as information literacy in order to be able to play an adequate role in the new information society. So generally, the managers feel that their computer and information literacy is insufficient and that of their companies even worse. From the narratives, it is obvious that there is a great need to learn about available information resources and how to gain access to, evaluate and use relevant information. Lack of computer and information literacy skills is a crucial barrier. The managers need specific training to become aware of the potential and the implications of information technologies in industrial work as well as to be able to make effective use of them.

Per, the manager of company D, also points to the fact that schools have the responsibility for preparing pupils for future work and that information literacy should be part of all curricula. He argues that the school has failed in this respect. Looking back, he points to the fact that in spite of having a university degree in civil engineering, he has very meagre skills in computer science as well as information-searching skills. He cannot remember whether training in information skills was a distinct part of the curriculum. He also admits that he has only now realized how crucial it is to have effective strategies for information searching to be able to solve problems and manage change.

The importance of information literacy can be further illustrated by the fact that all managers would like to attend an information literacy seminar at the Linköping University Library, including demonstrations of resources and hands-on experience.

Conclusions

In order to reach a deeper understanding of the situation in which the managers find themselves, I will summarize the findings using a metaphor, the journey. Hopefully, this metaphor will shed further light on the findings. In a figurative or transferred sense, the journey stands for the managers' future prospects and their perceived possibilities of keeping abreast with developments in order to reach the goal of being competitive. When scrutinizing the managers' thoughts, it is possible to further generalize them in the form of three identity groups

making up three different perspectives of travelling. The different perspectives reflect different styles of action.

The first group calls attention to the fact that the train of possibilities is about to depart. They have long dreamt of going on a sorely needed holiday. However, these managers are too involved in the daily work of solving urgent problems and feel that they cannot afford to take the time to catch the train. They are always working against time. They remember past events and are strongly influenced by bad experiences. Last time, when they went on holiday, it was raining cats and dogs almost every day and they had to spend most of the time indoors; the climate was really bad. In addition, they were rather disappointed with the hotel as well as the service and food. They were not very impressed by the menu, and they remember having to wait for ages before getting their food. Never again would they go on such a trip after that experience. Perhaps they would once again be bored and disappointed. They have also been told that there has been a sharp rise in the cost of living in France in the last few years. And they are not very good at foreign languages, least of all French.

Confronted by all the past and present difficulties involved, they realize that there is no chance of getting away and give up. All odds are against them; they cannot find the freedom necessary. And if they could - nobody knows what it might cost. It is not worth the trouble. After all, they feel they cannot go on holiday at all. There is no use in trying to catch the train. So the train leaves without these managers. But, hopefully, there will be other trains in the future.

The managers Per in company D and Lars in company Q belong to this group. Both are affected by a hostile environmental climate and when they do their packing they pack all their past and present experiences including failures, lack of resources. etc. as well as personal shortcomings such as lack of knowledge and skills, motivational states, etc.

Per is seriously affected by hostile environmental conditions leading to increasingly tough competitive conditions with the company in poor shape. Until now, he has resisted closing down the company, but it is not making a profit. Per feels that his freedom to act is very very limited and he cannot see the possibility of taking the time for strategic thinking; he is too curtailed (?) and involved in the day-to-day work, solving urgent problems. In addition, he suffers from a lack of computer and information literacy skills; he does not have the key to the information age society. So, the train of possibilities leaves without him.

Lars is also a member of this group. He suffers from information overload causing increasing distress and exhaustion as well as a lack of effective strategies for searching for, evaluating and using relevant formal information. He has the necessary technical equipment, but suffers from not knowing how to use it. As a matter of fact, he feels, that his knowledge is so restricted that he is afraid of attending a course and revealing his ignorance. He also says:

> Deep down inside, I'm unwilling to use new information technology because of all barriers involved when using it.

Computers are supposed to be user unfriendly. Nevertheless, he is sure IT has possibilities if someone could just tell him what they were. However, being too involved in the day-to-day work, he does not have the time to take advantage of these possibilities. So, the train leaves without Lars as well.

The second group catches the train without a clear destination in mind, a kind of mystery trip and interrailing at the same time. They are agreeable to any destination and if were possible, they would like to travel all over the world and find all sorts of fascinating places. When they do their packing, they pack a little of everything - just in case. They might just find it useful during the trip. There are, however, some huge black clouds in the sky and they are a little bit afraid because they are not very used to interrailing. The managers Anders in company F and Bengt in company O belong to this group. Relatively unprepared, they catch the train of new information technology without a clear purpose in mind.

The demands on industrial work in general and on small companies in particular made by the rapidly emerging internationalization of the societal economy and the global information society are very obvious to Anders and Bengt. They argue that the society of the late 1990s is quite different from that in the 1980's. New knowledge and skills are required in order to satisfy new demands. Therefore, it is important to catch the train of possibilities. There are, however, some black clouds in the sky. Some of these clouds represent the fact that information technology is a rather new phenomenon for them and that they find themselves in urgent need of computer and information literacy skills to be able to keep up with developments. For Bengt, some of the clouds represent the perceived instability of social, political and economic conditions. All together, these clouds cause a feeling of uncertainty, but this fact notwithstanding, Anders' and Bengt's prospects are fairly positive. They really look forward to learning more about the new technology and how to use it in order to keep abreast with developments. Both realize the fact that information technology will have an enormous impact on industrial work in the future. So it would be better to catch the train of possibilities even if you cannot see the destination; you have to take the chance.

The third group, finally, makes a carefully planned expedition. Every detail is minutely taken care of from beginning to end. They have a definite purpose in mind, to explore the country for the purpose of learning more about it. Nothing is left to chance in order to get the best out of the journey.
In good time before the date of departure, they consult the travel agency to get detailed information, including possibilities as well as limitations. In addition to the timetable with departures and arrivals, essential transport tips including connections, taxis, buses, subway, etc. as well as guided tours, entertainment, museums, sights and guides for restaurants, cafés, night life or whatever are requested. The information is thoroughly analysed, the timetable closely scrutinized and alternative arrangements evaluated. After these careful analyses of the total situation, including possibilities as well as limitations, they are ready to buy tickets. With packing with great care; nothing should be forgotten.
Manager I, John, is the most typical member of this group. He shows a remarkable awareness of the importance of utilizing information technologies in

order to stay competitive and, hopefully, to achieve competitive advantages in the future. No matter what the cost may be. In spite of the competitive pressures on the company, he mainly perceives possibilities not obstacles. His style of planning and acting is very proactive in character. The introduction of information technologies has forced him to rethink the way in which the industrial processes of his company was organized and he has been very successful in changing it.

Tore, the manager of company T, also belongs to this group, but does not show the same typical traits. In a way, he has a dual personality. He is aware of the importance of implementing information technology to achieve a competitive advantage in the future and has decided to employ an expert for an analysis of the needs and uses as well as the implementation of new information technology, including intranet and internet solutions. He also expresses a need for, above all, computer literacy skills. At the same time, he is, however, sceptical because everything has its price:

> Time is expensive. When it really matters, you cannot take the time to attend courses. You always have to ask yourself if you can afford it compared with the expected outcome. There are always urgent problems to be solved.

So there is a risk that the train might leave without Tore as well.

All together, the narratives show that the managers have understood the demands of the information age even if their information technology maturity seems to vary. Generally, the managers perceive information technology as a strategic resource for industrial work and for keeping up with environmental changes in order to achieve competitive advantages. They also realize the importance of effective strategies for obtaining access to, evaluating and using relevant information.

However, the interpretation of the narratives indicates that there are perceived barriers preventing the managers from using information resources; the most important ones are as follows:

- Legal, political and regulatory obstacles still remain
- Lack of physical access to information technology resources
- Lack of knowledge of information resources available or of their potential for industrial work
- Lack of computer literacy skills
- Lack of information literacy skills
- Lack of the necessary incentives
- Lack of time available for strategic planning in general and for searching and utilizing strategic information
- Lack of financial resources including risk capital
- Lack of knowledge - unable to find employees with appropriate competence
- Inadequate links between research and practice.

Working as a manager means being exposed to different strains all the time. These perceived barriers are strong enough to limit freedom of action. The findings indicate that the managers' use of information technologies and information utilization activities are based on their individual characteristics including above all knowledge, skills and motivational states, as well as on their personal situational perceptions and memory perceptions including various barriers. The managers' narratives indicate that working under this pressure results in the development of different personal strategies for survival. The different styles are based on the managers' personal perceptions, thoughts and prospects.

The narratives tell that, mainly, the pereived situational conditions including serious barriers faced already at the time of the diagnostic interviews still remain. In addition, technological advances combined with competition and growing internationalization has given rise to new demands on knowledge and skills. Above all, it was the managers' opinion that their information literacy skills are severely tested. They are in urgent need of this kind of competency in order to be competitive.

When taking the outcomes of the the intervention process (See, Chapter 9) into consideration, it is evident that isolated contributions in line with those of the actual project are not enough to bring about lasting changes. As the information environment continues to change and becomes increasingly specialized there is need for a stable structure of support including recurrent opportunities to continuously keeping abreast with the development of new facilities in the field of information supply.

Chapter 11

Discussion

In the preceding chapters, from 5 up to 10, a detailed presentation was given of the different types of results. This last chapter will bring these parts together and discuss the main findings in relation to the problems treated in the study, as stated in chapter 1, and to the theoretical framework, as outlined in chapters 2 and 3.

The chapter is divided into four sections. In the first section, the main findings are summarized and related to the objectives of the study and to the theoretical framework. In the second section, some methodological limitations of the study are identified and discussed. The following two sections focus on the theoretical and practical implications of the study. Finally, some concluding remarks are given.

A Short Summary of the Study

The primary aim of this study was to contribute to an increased understanding of the information utilization process through studying impeding process determinants, information barriers, and how they might be tackled by pedagogical means. This would be attained by studying the information situations of small-company managers. (The objectives of the study were outlined in Chapter 1). Three broad questions were to be answered by means of the project: Which barriers are perceived as obstructing the information utilization of the managers studied? How is information utilization affected by these barriers? Can barriers be eliminated or minimized by pedagogical means?

Methodologically, the project used a qualitative approach within the tradition of action research (see Chapter 3). Case studies were made of the information situations of twenty-three mangers from small manufacturing wood and mechanical industries.

Four main phases of the empirical part of the project can be identified: (a) diagnosis focusing on identifying barriers to information utilization, (b) planning and implementation of an educational intervention with a focus on ways of minimising barriers, (c) evaluation of the intervention to ascertain its effects, and (d) follow-up study after several years. Analogously, the results are described in terms of antecedent, process and outcome variables.

Theoretically, an interactional, cognitive approach to the problems served as a broad construct of the study. This would then focus on the meaning attached to a person's information utilization situation, on his perception of this situation and his behavior. A reciprocal effect was postulated between the individual information users and their information settings. In the theory outlined (see, Chapter 2), the effects of information barriers on an individual's information

utilization is seen as a dynamic interaction between the organism and the environment in terms of the user's cognitive system and the information barriers he encounters in an information setting. It is seen that a person's internal representations of the problem situation at hand, constructed in the light of his or her existing contents of mind and motivational states, mediate the same individual's response to the situation manifested in his or her information utilization behaviour. Perceived barriers are assumed to be important constituent elements of these cognitive representations. They originate at different contextual levels. A model distributing these barriers in four fields is proposed (see Chapter 2, Model of Analysis).

The empirical results of the study shed light on crucial barriers, show their importance to information utilization and how certain barriers can be minimized by educational means.

In the diagnostic phase, interviewee perceptions of the situation (including descriptions and judgements) were analysed on three levels, an individual, an organizational and a societal level. (See Chapters 5, 6 and 7). The results indicate perceived large-scale barriers at all three levels of analysis with far-reaching consequences for the interviewees' information utilization. Different variables referring to individual characteristics as well as organizational and societal circumstances seem to seriously obstruct the perceived possibilities and prerequisites of the interviewed managers as regards meeting their information needs. Some examples of crucial barriers originating at the three contextual levels may illustrate the findings:

At the societal level, the results indicate the importance of societal conditions to information utilization (see Chapter 7). The general economic situation in society, the tough competition in connection with a shrinking market has a moderating and inhibitory effect. Further, societal goals and intentions were mainly regarded as creating a depressed, unfriendly industrial climate with too little freedom for organizational action; in other words, anything but a motivating climate to small industries. As a determinant of motivational states the perceived situation was said to have a hampering effect on industrial activities including information utilization, development and change.

At the organizational level (see Chapter 6), the characteristics of managerial work in a small enterprise involving many roles to be played by a single person in combination with limited economic resources were found to result in lack of time and contradiction between short and long-term goals. These factors were said to seriously hamper the managers' degree of freedom in organizational action as well as their ability to meet the information needs of the company.

Some major barriers uncovered at the individual level of analysis (see Chapter 5) belonged to the field of internal resources according to the model. Above all, they indicate insufficient awareness and knowledge of existing available information resources, of lack of knowledge of methodology or strategies for information retrieval, negative attitudes towards and a lack of knowledge of libraries and their resources as well as insufficient knowledge of university resources among the interviewees. These barriers can be summerized as a lack of information literacy skills. In addition, the managers suffered from a

lack of technical knowledge and communication skills including foreign languages. On the whole, they found themselves illprepared to keep abreast with environmental developments.

Taken together, the empirical diagnostic findings indicate that information utilization reflects both person and situation. The results pointed to the need for educational measures among the interviewees, as well as to the need for organizational and environmental changes in order to eliminate or at least minimize crucial barriers. From this, it follows that certain forms of information utilization behaviour might be modified by changing situational characteristics. It is not only a question of changing or training individuals to behave according to situational forces, it is also a question of modifying situational forces in conformity with the ability and needs of people; in other words to change individual users as well as their information settings. Consequently, for a successful solution of the information barrier problems there is need for an intervention based on a holistic perspective seeking to eliminate or minimize barriers at all contextual levels. Such a large-scale task was, however, judged impossible within the frames of the present project (see Chapter 8, Choice of intervention). The only realistic goal was to solve a minor proportion of the problems found.

As the diagnosis clearly indicated that the information barrier problems to a large extent can be looked upon as a problem which can partly be addressed by pedagogical means, these findings became a basis for further work within the project. So, an attempt to improve the situation involves on the one hand, making a selection among the barriers that are found and, on the other, planning and implementing an educational intervention. The ultimate reason for the decision to introduce an educational intervention into the project was direct inquiries made by the interviewees themselves during the diagnostic interviews. As it turned out, it was natural to provide the support needed within the project (see further Chapter 4, Conducting the Empirical Study, and Chapter 5, Capacity of Information Seeking). At the same time, it provided an opportunity to reach a more profound understanding of the information barrier problems than would otherwise have been possible.

The intervention, a training and information program aimed at the managers, comprised two subprograms, an introductory program (Intervention I) and an intensified program (Intervention II). (The intervention program and the change processes were described in Chapter 8.) The main goals of the intervention were (a) to increase the managers' knowledge of available information resources, including the library and the university resources, (b) to develop the participants' knowledge of methods of and means for help in searching for information, and (c) to cause positive changes in affective states with respect to information utilization as well as library and university resources. In other words, the program was aimed to change knowledge and insight, perceptions, beliefs, expectations and attitudes in order to bring about more effective utilization of information resources, that is, a changed information behaviour.

The evaluation of the intervention (see outcome data presented in Chapter 9) indicates that educational measures of this kind seem to be a feasible way of minimizing certain barriers. This is shown not only by effects in terms of an

increased interest in library and university resources, but also in the form of concrete use of these resources. The changes occurred in the form of human-processual outcomes (knowledge, attitude and value changes at the individual level) as well as performance outcomes (behavioural, technological or structural changes at the individual or organizational level). Since the program focused on individuals and not directly on the organizations, the changes found were mainly changes with respect to individual perceptions, attitudes and skills and the effects at the organizational level were less extensive. Some behavioural, technological or structural outcomes at the organizational level were, however, found.

Developments from the mid-1980s to 1998 were measured in two ways, by an analysis of the extent of survival as opposed to failure and liquidation among the companies included in the study and by a follow-up study based on interviews with six managers from the surviving and reconstructed firms (see, Chapter 10).

The analysis of the extent of survival indicates that less than half of the companies have survived without reconstruction, reflecting the vulnerability of the small companies included in the study.

The results of the follow-up interviews were described as ethnographic stories by the managers, presented one by one and then analysed and summarized in the form of categories.

The first trait that emerges from the six narratives is a picture of an increasingly tough competitive climate in society. Times have been hard and threatening and the market conditions are not perceived as providing the necessary market incentives and availability of capital. With a few exceptions, the companies have been at a critical stage, balancing between survival or failure. Internal and external adjustments have been necessary to take in order to deal with the hostility. In the managers' view, there is still, compared with the 1980s, a need to bring about a radical change in the attitudes of society towards small companies and entrepreneurship as well as to make the regulatory framework transparent, stable and predictable.

A general view of developments since the 1980s is the rapidly emerging globalization of the societal economy with consequences for the strategies of small companies. Most companies have strengthened their position on foreign market positions from a focus mainly on the domestic market in the 1980s, but increasingly tough competition has placed new demands on the companies.

The results also indicate that the information age is a perceived reality for the managers of the study; a global information society with great demands on industrial work. Information technology is supposed to be a strategic resource for industrial work. Information technology is, however, a fairly recent phenomenon for most managers and their computer literacy is limited. They are ill-prepared to deal with the challenges of new information technology equipment.

The findings also indicate that technological developments combined with the competitiveness and growing internationalization have given rise to new knowledge and skill requirements for industrial work; the competence of the

managers and the employees are severely tested. In the managers' view, the general level of skills must be improved, but some key skills are stressed as crucial: Technical engineering, communication skills including foreign languages and intercultural communication, computer literacy skills and information literacy skills. The managers generally find information searching extremely difficult from a global perspective and realize that they sorely need effective search strategies using information technology. Lack of computer and information literacy skills is perceived to be a crucial barrier. The findings indicate that most managers in this study do not know how to find and use information effectively and seem to be in urgent need of computer literacy as well as information literacy in order to play an adequate role in the information age. From the follow-up study (Chapter 10) it is evident that, as the information environment continues to change and becomes increasingly specialized there is need for a stable structure of support including recurrent opportunities to continuously keeping abreast with the development of new facilities in the field of information supply.

The findings of the follow-up study were summarized using a metaphor, the journey. In a figurative or transferred sense, the journey stands for the managers' future prospects and their perceived possibilities to keep abreast with developments in order to reach the goal of being competitive. The managers' thoughts, emerging from the narratives, were generalized in the form of three identity groups making up three different styles of action:

- The first group calls attention to the fact that the train of possibilities will leave. However, since they are so involved in the day-to-day work of solving urgent problems, they cannot afford to take the time to catch the train. The train of possibilities leaves without these managers.

- The second group catches the train without a clear destination in mind. Relatively unprepared, they catch the train of new information technology without a clear purpose in mind. Perhaps they will find it useful.

- The third group, finally, embarks on a carefully planned expedition. Every detail is minutely taken care of and nothing is left to chance. These managers' style of planning and action is very proactive in character.

The follow-up study indicates that the managers show two different ways of dealing with the situation in relation to information technologies and information utilization, a reactive way mainly indicating a wait-and-see policy causing passivity or non-use and a more proactive way of acting indicating large-scale use of information technologies as a deliberate strategy to gain competitive advantages and success; these two perspectives can be said to reflect two different managerial styles of acting vis-à-vis information technologies and information utilization. Proactiveness means controlling developments, while reactiveness means being controlled by developments. Proactiveness and reactiveness are assumed to be the end poles of a continuum.

Taking the results of the different parts of the study in consideration, it can be concluded that working as a manager meant in the mid 1980s and still 1998 means being exposed to different strains all the time. The managers are suffering from the tough competitive climate and feel that they lack the time necessary to plan or search for information strategically. Most managers stress that they are too involved in the day-to-day work and that they do not have the necessary freedom, either financially or in terms of time. They are also in urgent need of computer and information literacy skills in order to be able to play an adequate role in the information age.

The main findings indicate that the managers' use of information technologies and their information utilization activities are based on their individual characteristics including, above all, knowledge, skills and motivational states, as well as on their personal perceptions and interpretations of the information situation at hand and memory representations including various barriers. It is shown that, mediated by motivational and other affective states, the quality of these representations, of which perceived information barriers are important constituents, guide his course of action in terms of his information utilization behaviour; the individual's interpretation of a situation obviously plays an essential role in his adjustment to reality. Differences and variations between cases further illustrate this fact; for example, the differences appear in the shape of individual profiles of information utilization and different styles of action vis-à-vis information technologies and information utilization as well as different strategies for survival. The perception of the individual potential scope for action within the frames of barriers seems to be important since it, obviously, has the power to restrict an individual's search for information and his acquisition and utilization of this information so seriously that not even the scope for action is used.

Thus, taken together, the findings indicate that information utilization reflects both person and situation. It is also important to stress that it is not only the actual situation that seems to influence the managers' information utilization activities. They also seem to be heavily influenced by earlier processes and situations they have faced. In other words, the individual's interpretation of a situation, present and past, seems to play an essential role in his information utilization behaviour.

In summary, the present project has provided theoretical and empirical knowledge of concrete information settings and conditions of information utilization, knowledge of suitable educational models as well as knowledge of processes of change and development.

Methodological Limitations

The methods used in this study (described in Chapter 4) were believed to be appropriate and viable for solving the research problem within the framework of the project (see Chapter 1, The Setting of the Study). The overall impression is that the explorative and descriptive purposes of the study have been achieved,

theoretically as well as empirically. It is, however, necessary to remind the reader that the study was carried out with limited resources. The question is, however, whether methodological limitations may pose a threat to the adequacy of the results. The theoretical considerations regarding the methodology were discussed in detail in Chapter 3. Limitations anticipated in the design of the study were presented in Chapter 4. Only a few additional comments will be given below.

The first issue concerns selection and number of subjects. It must be noted that the study was limited in terms of the number of participants. Besides the advantages of the method in solving the research problem, available time and resources were factors in the decision to apply a small-scale case study approach. For this reason, it was not feasible to use a random sampling technique. Instead, an available sample of volunteers was used. (Compare what was said in Chapter 4, Choice of method.) The drop-out rate from the intervention was, however, rather high. But the reasons found for this indicate that this phenomenon may not primarily be due to the shortcomings of the study; as a matter of fact, the drop-outs from the intervention provide additional information about crucial barriers which prevent the participants from attending courses and thus improving their information situation (See, Chapter 4, Analysis of Drop-Outs from the Study).

As regards the validity and reliability of measures, different steps were taken to respond to these canons. During the initial planning stage, a pilot study was carried out in order to develop appropriate methods. The interviews were then conducted in a trustful setting which can be characterized as a dialogue between researcher and subjects. Further, more than one data-collection technique (triangulation) was used. All these facts promote the reliability, or internal validity, of the results. Finally, efforts were made to report the procedures, decisions and results with adequate precision. By keeping the collected data in a well-organized display form, necessary steps were taken to promote re-analyses. (Compare what was said in Chapter 4, Conducting the Empirical Study.) Nevertheless, caution should be taken when drawing conclusions with regard to what caused the effects of the intervention in this project. The effects are clearly indicated, but it is impossible to say whether they were caused by the intervention itself or by a combination of the program and the role of the researcher. It should be stressed that this fact is not problematic since the active role of the researcher can be considered to be part of the intervention itself. One should also be aware of the possibility that marginal effects could have been reached already during the diagnostic interviews.

The last methodological issue to be discussed concerns the generalizability of the results, the external validity. This means the extent to which it is possible to generalize the results to other groups, settings, and times. This is the dilemma of traditional educational research. It must, however, be stressed that in this study there is no such emphasized intention of generalization. Individual cases have been studied with the primary objective of exploring the information barrier problems in order to develop a holistic, theoretical framework and to describe the phenomena studied in order to arrive at a theoretical understanding.

Consequently, issues of existence are prior to issues of generality. The question is, however, whether the information obtained about each individual is sufficient to draw conclusions. This requirement seems to be adequately met.

So it is difficult to say whether the results of the actual study can be generalized to other situations on a theoretical basis. Only further empirical research in other organizations and other situations could give the correct answer to this issue. Nevertheless, the fact remains that the information barrier problems affecting the process of information utilization have general validity, given differences in number and character, to all citizens in society (compare with what was said in Chapter 1, Determining the Objectives of the Study). The results of the present study indicate that the problems vary depending on how users perceive and interpret their information situations. This means variation according to personal prerequisites as well as to context through the dynamic interaction between the cognitive system of the user and physical events he encounters in an information setting. (See, the theoretical framework outlined in Chapter 2). If these underlying assumptions are considered, it might be possible to generalize the results of the study also to other individuals, other groups and other settings in society.

Ultimately, the significance of this study depends on its use. It has the potential to provide a source of background information about information settings and a theoretical framework which can be used as a starting-point for future research projects as well as for the development of and improvement in the provision of information in society. The following sections will further elaborate these questions.

Implications for Future Research

The research presented is the result of an effort to develop a holistic interactional theoretical approach (presented in Chapter 2) to the study of the conditions of information utilization. Further development of the theoretical attempts presented in this thesis as well as complementary approaches seems particularly important in order to arrive at an understanding of the conditions of the information utilization process.

Since this study indicates that the individual's interpretation of a situation plays an essential part in his information utilization behaviour, there is, in research and practice, a need for systematic analyses of these interpretations both for individuals and for groups. The study provides a framework which could be used as a starting-point for new research. The interactional theoretical perspective is sufficiently broad to provide a foundation upon which a variety of studies could be developed in which the relationship between individual and environment can be brought into focus.

It may be hypothesised that the suggested approach could form a valuable basis for research programs concerning the information and knowledge society. There is an urgent need for a theoretical foundation for discussions about this

new society as well as research into the same problem. So far, studies in this field have mainly been carried out within the disciplines of technology and economics (Söderqvist, 1988). Consequently, there is a need for further research based on a theoretical foundation within the field of behavioural sciences, that is, education, psychology and sociology, as well as interdisciplinary studies. The approach in this study has the advantage of integrating theoretical evidence from these disciplines into a holistic theoretical framework explaining the interplay between information utilization, the dominating process in the information society, and the societal context; it covers the contextual unit of which this process is a part, a societal unit consisting of three levels of analysis, an individual, an organizational and a societal level.

The present study has explored the information barrier problems from a special perspective, that is, from the users' point of view. This means that the focus is mainly on one part of the total information process. There is a need for further research from the perspective of the user. But for future research, it could be important to look at the information barrier problems from the perspective of the information suppliers/the resource systems and the information carriers as well. In seeking scientific understanding of the processes of information transfer in society, it is necessary to consider the mediation between source and recipient as well as between channel and recipient.

Practical Implications

To summarize, the present study not only calls attention to crucial barriers to information utilization but, perhaps even more importantly, it also points to possible ways of eliminating them. The data support some practical implications, which will be eleborated under the following subheadings.

The Need for Improvements within the Information Supply

First of all, in order to promote information supply and information utilization, politicians and authorities have to set the long-term objectives for measures and policies and make priorities in a global perspective to create an appropriate political and regulatory environment as well as information infrastructures. In the work of providing guidelines for future development and identifying appropriate political goals it is valuable for the decision-makers to reflect on past, present and future orientations. Therefore, it is necessary to disseminate knowledge among these decision-makers about the conditions of information utilization generally, particularly with a focus on the information barrier problems and how they can be minimized or eliminated. There is also need for information about the information situation of different groups in society; this study points in particular to the situation of the small companies.

Further, in order to augment the general understanding in society of the process of information utilization and the obstructing effects of information

barriers, it is important to disseminate research results. It may be noted, that the actual study included disseminating the scientific results by other means than research reports. This took place during seminars for other researchers, for librarians and other practitioners within the information provision sector and future librarians. It also meant teaching students at Linköping University, where the course Knowledge Development and Information Utilization (See, Appendix 4) has been developed on the basis of the results of and experiences drawn from the present study.

Further, efforts must be made to improve the structuring of information and user-friendliness of information retrieval systems and their interfaces in order to improve the supply of information and to encourage the use of information resources. Developers of information systems in, for example, the field artificial intelligence and other fields of technology must acquire an understanding of general conditions and the needs and characteristics of the information settings of different user groups in order to be able to design user-friendly and effective interfaces. The present study of information barriers indicates the importance of taking the users' thoughts and the way they conceive the world into consideration in the design of new information retrieval systems. It can be hypothesized that the user interacts with the system on the basis of his mental or cognitive model of its nature, function and possible service outputs (Borgman, 1986; di Sessa, 1986; Waern, 1987). What constraints or barriers are perceived by those who will use the system? Such conditions should be studied in detail, particularly if a computer system is to be introduced for the first time.

It is also important to take the information barrier problems into consideration in the information supply. This message should be communicated among librarians and other information professionals in order to improve the information supply to different groups in society. The results of the actual study points to the kind of information services that could improve the information utilization of small companies. Some recommendations will be given of what can be done to encourage small companies to use information:

- Support should be individually adjusted to break information barriers and to suit different styles of action and information profiles

- Small companies could be supported by developing information resources disigned to build networks

- Small companies could be supported by establishing or improving linkages that enable scientific and technical information to reach potential users. The linkage between research and practice in general as well as between universities and small firms should be augmented. New kinds of collaboration could be established.

- Small companies could be supported by developing new professional roles. Libraries and university libraries in particular could play a more obvious role

to small firms. Libraries and librarians could be partners in supporting networks

- Recurrent opportunities to continuously keeping abreast with the development of new facilities in the field of information supply should be offered
- Recurrent reviews of available university and library resources should be offered.

The Need for Information Literacy Programs

As the information environment continues to change and becomes increasingly specialized the ability of people to adapt to ocupational and other changes throughout their lives will be put to a severe test. In industry, these changes continuously causes managers and staff to optain new knowledge and update their skills throughout their lives. The development of the individuals ability to adapt will, therefore, become increasingly important.

In recent years, executives and companies have devoted considerable effort and resources to developing the general competence (basic knowledge), the professional skills (new technology, new styles of leadership, new work routines and so on) and the developmental competence (the ability to identify and solve problems, strategic thinking, planning for the future and the like) of their employees in order to bring about organizational changes. However, these efforts have seldom been focused on augmenting the organizational and individual capacity for searching and utilizing information despite the well-documented importance in the literature of information to problem solving, decision making or almost any human activity (compare what was said in Chapter 1). This shortcoming ought to be considered and measures taken. In the light of the present study, it is essential to strengthen the individual's ability to utilize information. Information literacy should be regarded as a necessary component of entrepreneurship.

This points to the need for information literacy programs, general ones as well as those designed for specific groups such as small and medium-sized companies, with the purpose of strengthening information utilization and the ability to adapt.

On the part of society the need for higher education responding to the increasing demands of the future labour market with respect to innovativeness and flexibility in an increasingly international world with accelerating knowledge development has been stressed. At the same time, there are demands that universities produce students and researchers who are information literate and self-propelling, meaning they are able to act in a rapidly changing, complex and information-rich environment for optimal competitiveness and success (Lantz, 1997). Thus, *in order to meet* these *societal claims there is every reason to state information literacy as one goal for education and let this goal influence all levels of education from elementary school to and inclusive higher education*

(SOU 1992:1; Breivik, 1992, 1998; Lantz, 1996, 1997; Studenternas bibliotek, 1996). If this is done, there is hope for a future generation of information literates as well as a future generation of information-literate managers of small and medium-sized companies. *Information literacy is not only an important educational goal in society - it is the key to society itself today and tomorrow!* (Kuhlthau, 1995; Lantz, 1997).

Some work of training have already been started by most university libraries in Sweden and it is important to devote the financial and personnel resources necessary to continue this work. Until now, these programs have mainly been directed at students and university staff. However, also external user groups, for example, managers of small and medium-sized companies, are in urgent need of such training. Analogously, as we move further into the information age, it seems necessary that also the public libraries devote resources to training users to orientate themselves within the enormous flow of information in society (see what was said in Chapter 1, Supply of Information - in Support of our Global Orientation). As information and knowledge become an increasingly important requirement of society and its well-being increasingly depends on our ability to use globally produced knowledge and experience (see what was said in Chapter 1, Being Informed in the Information Age) it is extremely important to initiate training in the ability to identify and articulate information needs, apply suitable strategies to find relevant sources of information, evaluate the information found and to assimilate and use their contents as early as possible during a person's life, from the early school years, and so forth. In other words, information literacy should have a clear position in educational curricula at different stages in the school to prepare pupils to meet the demands of the information society.

As was seen in the background to this thesis (Chapter 1, Information Needs in Companies), large resources have been spent on the development of new information services in order to transfer scientific and technical information to the target group consisting of small and medium-sized companies, but generally, these efforts have not been very successful (Johansson, 1997). It has to be noted that these new interfaces tend to be introduced without the necessary attention being paid to the real information needs of the users (Capital Planning Information, 1982, SOU 1998:77) and without any accompanying introductory training program. In the light of the results of the present study, these disappointing outcomes are not surprising. It is essential to build new systems and create new services on the basis of a comprehensive understanding of the conditions of information utilization, including information barriers, as well as to educate the clients as to new opportunities and problems that will face them.

As concerns the needs of small companies, some recommendations could be made from the results of this study:

- Information literacy should be stated as an important goal of education and integrated into curricula at all levels

- Information literacy should be regarded as a necessary component of entrepreneurship

- Computer literacy as well as information literacy training should be integrated into programs of entrepreneurial training

- Consultants and other resource-professionals should be information literate

- Information literacy courses including distance learning courses (using information technologies) should be designed and implemented.

- As the information environment continues to change, particular attention should be paid to the continuing education and reskilling of staff in small companies.

Some important recommendations for planning and implementation of future developmental programs can be derived from the experiences of the intervention in the present project, but stating a single *right approach* is not possible. It is, however, necessary to be aware of the importance of integrating learning processes required to meet the goal of information literacy (compare with Breivik, 1998):

- recognizing and articulating an information need
- identifying information needed to address a given problem or issue
- developing effective search strategies and choosing appropriate tools
- finding the information required
- evaluating the information
- organizing the information, and
- using the information effectively to solve the problem at hand.

To enhance the learning environment, each group needs a careful analysis of its own requirements, but to be successful it is necessary to consider some well-known psychological principles which are valid in every learning situation (see, for example, Entwistle, 1997). The most important of these are as follows:

- consideration of the content of people's thoughts,
- consideration of earlier knowledge and experience,
- suitable degree of motivation,
- own activity,
- concretization, and
- feed-back.

In the present study of information barriers, it was found important to take experiences within the field of implementation research into consideration in order to bring about effects or changes (see Chapter 3, The Intervention in the Perspective of Organization Development). The results of the study indicate that teaching should be designed on the basis of the subjective thoughts and beliefs of people in order to cause effects. Furthermore, the main goal is to change the content of these thoughts, beliefs or perhaps attitudes. In other words, to create a new world view, a cognitive model or just new material from which new,

decisive steps in information processing and actions can be performed by the user, hopefully resulting in a desired degree of implementation, meaning an effectively augmented process of information utilization.

It is important to use a dialogue-based form of action; to make possibilities and difficulties clear from the perspective of the participants, paying the utmost attention to their individual prerequisites. As far as possible, learning situations should be designed and adapted on the basis of the participants' needs as well as being adapted to economic, cyclical, geographical and other frame factors in order to motivate learning and increase the possibility to attend. Another source of motivation comes from the fact that the participants should be actively involved in the learning process, abowe all, through own problem solving or own information search processes. Furthermore, the criteria of motivation and concretization should be satisfied by making the learning processes relevant, starting from perceived concrete problems of the individuals and their organizations. The students should be encouraged to access the multitude of information resources available, traditional as well as electronic. Consequently, we can call the learning aimed at individual centered as well as problem- and resource-based. The final step in the learning sequence is the delivery of feedback to the learner. A valuable source of feedback can come from an evaluation of executed information searches on the participants' own problems focusing on the effectiveness of the strategy used as well as the quality and usefulness of sources found. This kind of feedback will allow the participants to evaluate the information reources used as well as to criticize their own information utilization behaviour. This kind of program represents a transition from a teaching to a learning culture.

Good teaching, consequently, needs care in design and execution, a lot more than just knowledge of the subject matter. Each of the factors affecting the instructional situation must be analyzed and considered in order to prepare the participants to be effective users of information for life-long learning.

The Pedagogical Role of Libraries and Librarians

Most implications discussed in this last section touch on the question of professionalism within information supply and the role of the librarian. To be able to meet new and increasing demands for information in society, information systems and channels must have maximum flexibility and adaptability (compare with what was said in Chapter 1, Supply of Information - in Support of our Global Orientation) with consequences as far as to the role of information professionals and, in particular, that of the librarian. The librarian may no longer be only a supplier of information, but also a teacher, trainer and instructor, a tutor, an agent for change, a consultant, a linker of sources and recipients as well as a general resource person. In other words, a broader and more pedagogical role. This will become increasingly necessary in the profession of information providers as the use of information technology increases, resulting in new media and advanced information retrieval systems

aimed at librarians as well as library users. Libraries need to reach out to users and help them find and use the information they need.

In recent years, growing emphasis has been placed on the pedagogical role of the university libraries and librarians and on the need to make information literacy one of the goals of higher education (for example, SOU 1992:1; BIBSAM, 1996; Lantz, 1997; Breivik, 1998). The future role of librarians is to large extent a question of taking part in the education of an information-literate generation (Kuhlthau, 1995; Lantz, 1997). Kuhlthau points to the fact that information literacy is the key skill of an individual enabling him/her to keep abreast with developments using globally produced information in the information age. In other words, this is a future of utmost importance to libraries and librarians as a profession.

However, libraries and librarians themselves must be aware of their pedagogical role and allow it to influence all library work. The pedagogical role is not only a question of arranging planned educational settings; every meeting with students, teachers, researchers and other clients should be seen as an important pedagogical setting for reaching the goal of information literacy. Librarians must be aware of their tutorial role within their daily reference work (Lantz, 1997). And they must not steal the students' own learning by solving the information problems of the students themselves. Instead they should be aware of their role of teacher, tutor, process-helper, agent of change, etc.

Changing requirements need special attention in the education and training of future information professionals. Information environments and interfaces between systems and clients of today require knowledge of a variety of fields. Besides professional expertise and skills in, for example, knowledge and its communication, sources of information, information indexing, organisation and storage, retrieval and dissemination techniques as well as familiarity with a variety of subject matters, librarians of today and tomorrow increasingly need knowledge of pedagogics, information technology and telecommunications. In my opinion, the ability to integrate theory into practical information work is an important characteristic of professionalism in librarianship. In order to promote professionalism in the field of information supply and to attain fruitful results from theory and practice together, it seems important to strengthen multi- and interdisciplinary library research as well as postgraduate studies in the field of library and information science in Sweden.

Concluding Remarks

Hopefully, taking the implications of this chapter into consideration, future contributions will transform a desirable strategic and successful trend into a concrete reality. Taking theoretically and empirically grounded knowledge of the information barrier problems into consideration it might be possible to maintain and develop professional competence in society, as well as to create the prerequisites necessary for taking advantage of each individual's civil rights.

Ultimately, there is hope for a situation characterized by harmony and democratic development implying a bridging of the gap between those in society who are strong and those who are poor in terms of information and knowledge (compare with what was said in Chapter 1, Information Use - a Requirement for Development). Information literacy, the ability to locate, process and use information effectively equips individuals to take advantage of the global opportunities for life-long learning; to be active learners who can search for, locate, integrate and apply information from a variety of sources to enhance their quality of life, success in work, and safeguard their civil rights.

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Diagnosis: Interviewguide

Personal Background

- Age
- Number of Years of Employment/Years as Managing Director
- Educational Background
- Capacity of Information Seeking/Information Literacy Skills

Attitudes and Motivational States

- Perceptions of beeing a Small-Firm Manager
- Personal Goals and Incentives
- Perceptions of Knowledge and Knowledge Needs
- Perceptions of Information Seeking: The Semantic Differential
- Perceptions of Libraries and Libraries' Role
- Perceptions of Universities and Universities' Role

Company Characteristics

- Company History
- Size/Number of Employees
- Line of Business; Products; Number of Products
- Personnel Resources/Available Competence
- Organizational Structure
- Economic Situation of the Firm/Sales Volume/Profitability
- Perceived Degree of Freedom to Act
- Market Position; Domestic - Exports
- Perceived Organizational Goals (Shortterm - Longterm - Future Prospects)
- Perceived Possibilities of Goal Accomplishment
- Impact of Time to Organizational Activity
- Level of Technology: Low - Medium - High
- Technology: Innovativeness - Frequency of Change
- Perceived Innovativeness of Products - Frequency of Change
- Impact of Technology on Information Utilization

The Information Setting

- Information Needs/Motives of Information Seeking/Ranking of Perceived Importance
- General Characteristics of the Information Setting
- Information Resources within the Firm
- Sources of Information Used; Formal - Informal Sources of Information
- Perceived Barriers to Information Utilization
- Time/week devoted to Information Utilization/importance of the Variable Time to Information Utilization

Environmental Dynamics and Influences

- Industrial Climate
- Societal Goals and Intentions
- Impact of Laws, Rules, Regulations and other Decrees
- Environmental Conditions: Stability - Change, Simplicity - Complexity
- Market Conditions
- Perceptions of Competency in Society
- Availability of Societal Information Resources

INFORMATION SEEKING

Positive	:____:____:____:____:____:____:____	Negative
Valuable	:____:____:____:____:____:____:____	Worthless
Essential	:____:____:____:____:____:____:____	Unessential
Meaningful	:____:____:____:____:____:____:____	Meaningless
Interesting	:____:____:____:____:____:____:____	Boring
Restful	:____:____:____:____:____:____:____	Laborious
Easy	:____:____:____:____:____:____:____	Difficult
Simple	:____:____:____:____:____:____:____	Complex
Active	:____:____:____:____:____:____:____	Passive
Rational	:____:____:____:____:____:____:____	Intuitive
Competent	:____:____:____:____:____:____:____	Incompetent
Successful	:____:____:____:____:____:____:____	Unsuccessful

Evaluation of Intervention I and II: Interview Guide

1) Characteristics of the Intervention Program

- Assessments of the Relevancy of the Program to practical Work in the Company (Ratings on a 4-Point Scale: Completely irrelevant, Fairly irrelevant, Fairly relevant, Very relevant)

- Assessments of the Importance of the Content to practical Work and of the overall Values of the Information given (Ratings on a 5-point Scale; 5 = most positive)

- Assessments of Program Quality (5-point Rating Scale; 5 = most positive)

  Adequacy of Scope
  Explicitness
  Complexity

- Assessments of Organization and Working Forms (5-point Rating Scale)

  Advance Information
  Schedule
  Practical Arrangements
  Participant Composition
  Administration and Guidance
  Timeliness of Implementation
  Forms of Work

2) General Perceptions and Overall Outcomes of the Program

3) Personal Development with Respect to Insight and Knowledge.

- Range from 1 to 4:
  Not at all 1, 2, 3, 4 To a very large extent

4) Perceived Changes in Attitudes:

- Perceived Changes in Attitudes towards the Library as an Information Resource
- Perceived Changes in Attitudes towards the University as a Resource

5) Program-related Outcomes:

- Assessments of the Profit (Success) of the Program.
  Please Rate on a 5-Point Scale from 1 to 5.
  (5= most positive)

Stimulating Element of Work	1, 2, 3, 4, 5
Increased Knowledge	1, 2, 3, 4, 5
Valuable Contacts	1, 2, 3, 4, 5
Hints, Material of Practical Value	1, 2, 3, 4, 5

Comments: _____

6) Performance Variables

- Effects in Terms of Perceived Behavioural Change: Effects on the Performance of the Information Utilization Process

- Effects in Terms of Perceived Degree of Implementation.
  Please Range from No Interest to Practical Use of Resources!

No current interest	Would like to use	Have decided to use	Have already begun using

Resources to be judged:

The University library
Printed Bibliographies
Journals
Databases on-line
The University

Appendix 3.

Follow-up Study: Interview Guide

1) Developments from the mid 1980-s to 1998.

2) Actual Situation of the Company
   - Goals
   - Products
   - Technology
   - Economic Situation
   - Competitiveness

3) Environmental Dynamics and Influences
   - Industrial Climate
   - Societal Demands: Regulatory Framework etc
   - Internationalization and Globalization of Economy
   - Market Incentives

4) Actual Situation of Information Utilization.

5) The Role of Information Technology
   - Individual Level
   - Organizational Level
   - Society Level

6) Information Technology Resources and Equipment Available

7) Use of Information Technologies

8) Perceived Possibilities of Keeping Abreast with Developments. Perceived Barriers.

- Knowledge and Skills
- Computer Literacy and Information Literacy
- Educational Needs

9) Future Prospects

KURSPLAN

Linköpings universitetsbibliotek

Linköpings universitetsbibliotek anordnar kurser för anställda och studenter vid universitetet, samt andra intresserade eller yrkesverksamma, inom området informations- och biblioteksvetenskap. Syftet med kurserna är att deltagarna skall förvärva kunskaper om hur biblioteket och dess olika informationssystem, till exempel databaser, kan underlätta informationssökandet vid studier, forskning och annan verksamhet. Kursernas inriktning är tvärvetenskaplig, vilket betyder att innehållet hämtas från flera skilda ämnen, främst pedagogik, informations- och systemvetenskap. Även tekniska och praktiska övningar i informationssökning genomförs.

Kunskaps-utveckling och informations-utnyttjande

5 poäng

Kunskapsutveckling och informations-utnyttjande
(Knowledge Development and Information Utilization)
5 poäng

Ämne: Ämnesövergripande

Nivå: X

Dnr 783/95 E240
Kurskod HBIX01

1 SYFTE

Kursens syfte är att deltagarna skall förvärva kunskap om den strategiska resurs som information och kunskap utgör i ett samhälle präglat av en intensiv teknisk, ekonomisk och social utveckling. Deltagarna skall förvärva grundläggande kunskaper i hur man söker information/litteratur för vetenskaplig kunskapsutveckling, problembaserad inlärning (PBI) inom skolan/högskolan, problemlösning, beslutsfattande, kunskapsutveckling och förändring i allmänhet.

Kursdeltagarna skall förvärva god insikt i tillgängliga sökhjälpmedel med utnyttjande av ny informationsteknologi och förbereda egna sökningar i samband med egen forskning och/eller verksamhet som lärare, handledare, beslutsfattare mm.

2 INNEHÅLL

Kursen inleds med en allmän översikt över "informations- eller kunskapssamhällets" effekter när det gäller vårt behov av omvärldsbevakning och utveckling på samhälls-, organisations- och individnivå. Momentet avses ge introducerande perspektiv på området och behandla konsekvenser av teknikutveckling, kunskapsutveckling etc.

De följande momenten avser en fördjupning inom några väsentliga områden. Tonvikt kommer här att läggas på:
– Vetenskaplig kunskapsutveckling och vetenskaplig kommunikation
– Informationsutnyttjande för självstyrd inlärning i samband med Problembaserad inlärning (PBI) som pedagogisk metod och andra undersökande arbetssätt inom skolan/högskolan.
– Informationsutnyttjande för problemlösning, beslutsfattande, förändring mm inom företag, förvaltningar och andra organisationer.
– Informationsutnyttjande som process med dess förutsättningar och hinder.
– Grundläggande informationssökningsmetodik.
– Tillgängliga hjälpmedel för informationssökning med tonvikt på ny informationsteknologi.
– Demonstrationer och övningar avseende datorbaserad informationssökning online (inkl INTERNET) och på CD-ROM.
– Litteratursökning inom eget ämnesområde.
– Dokumentanskaffning.
– Referenshantering

En fördjupningsuppgift som består av författande av en uppsats/paper genomförs. Här ges möjlighet till fördjupning inom eget valt område med relevans för de egna studierna, forskningen eller yrkesverksamheten. Sammantaget avser således kursen beakta såväl makro- som mikroaspekter på det aktuella problemområdet.

3 FÖRKUNSKAPER

För tillträde till kursen krävs godkänd akademisk utbildning om 20 poäng (motsv).

FILOSOFISKA FAKULTETEN
Fakultetsnämnden för humaniora och samhällsvetenskap
Tel 013-281000 vx

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4 UNDERVISNING OCH EXAMINATION

4.1 Undervisning

Undervisningen ges i form av föreläsningar, seminarier, demonstrationer och övningar.

4.2 Examination

Kursen examineras genom författande av uppsats/paper som behandlas vid avslutande seminarium. Kurslitteraturen examineras genom muntligt prov.

Studerande som ej blivit godkänd i ordinarie prov erbjuds normalt tillfälle att delta i två extra prov.

Studerande som underkänts två gånger i prov för kursen eller del av kursen har rätt att begära att annan lärare utses att bestämma betyg för henne/honom.

Den som godkänts i prov får ej delta i förnyat prov för högre betyg.

4.3 Betyg

För kursen ges betygen väl godkänd, godkänd och underkänd.

5 KURSBEVIS

Kursbevis utfärdas, efter begäran av den studerande, av Fakultetsnämnden. Begäran om bevis skall göras på särskild blankett som finns på institutionen. Den skall inlämnas till StudentCentrum.

6 KURSLITTERATUR

Enligt bilaga som finns på Universitetsbiblioteket och Fakultetskansliet för humaniora och samhällsvetenskap.

Kursplanen är fastställd av Fakultetsnämnden för humaniora och samhällsvetenskap 1995-03-31.

Utbildningsområde: TE

Ämnesklass enligt SCB: ÖÄA

Kurskod HBIX01

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